

(Plan Created 12/18/2022, amended 5/24/2024)

**Program Assessment Plan
Certificate of Proficiency in Brewing Science
University of Arkansas**

Department Name & Contact Information for the Certificate of Proficiency in Brewing Science,

Department of Food Science
2650 North Young Avenue
Fayetteville, AR 72704
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Dr. Renee Threlfall, Research Scientist (rthrelf@uark.edu) and Dr. Scott Lafontaine, Assistant Professor (scottla@uark.edu)

Food Science Department Vision and Mission

Strengthen sustainable local and global food systems with innovations for improving human health and food security through education, research, and outreach.

1. Lead scientific discovery and innovations for enhancing food quality, safety, security, sustainability, and accessibility.
2. Understand the relationships among food, health, and consumer behavior to enhance human health and well-being.
3. Provide approved curriculum, distance learning, and extension materials to train workforce for supporting food industry.
4. Build a community of students, staff and faculty that reflects the land grant mission of serving our pluralistic society by embracing diversity, equity and inclusivity.

Certificate of Proficiency in Brewing Science Program Goals

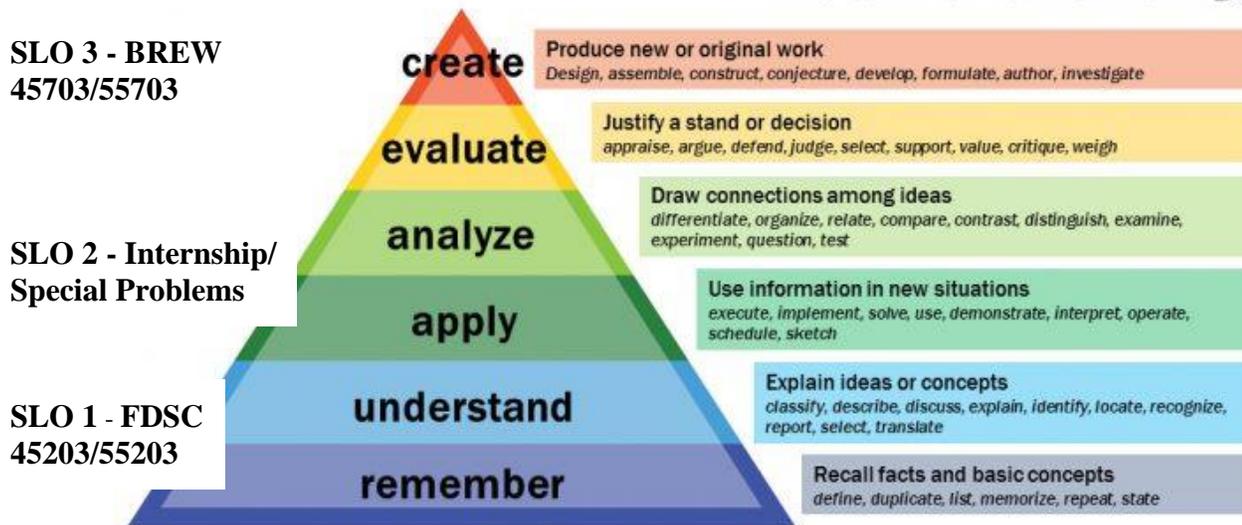
The Certificate of Proficiency in Brewing Science Program (BREWCP) at the University of Arkansas is an interdisciplinary collaboration across three colleges that combines the science and engineering knowledge needed to produce skilled employees in the craft brewing industry. BREWCP combines theoretical understanding with practical application. The certificate is made up of six credit hours of required courses, three hours of internship/special problems, and six hours of electives. In total, the BREWCP is 15-hour certificate program that incorporates core brewing and fermentation courses, chemistry, biology and engineering electives, as well as applied work and research opportunities which are designed to provide students with a well-rounded understanding of beer brewing. The program is housed in the Department of Food Science, and incorporates courses from the Dale Bumpers College of Agricultural, Food and Life Sciences, the Fulbright College of Arts and Sciences, and the College of Engineering. At the end of the brewing certificate program, the following are the expectations.

1. Graduates will develop core brewing skills which are required to perform at a high level in industry related positions and/or will help them to continue their education in a professional program.
2. Graduates will be able to integrate, examine, and assess new information to make knowledgeable decisions.
3. Graduates are expected to be able to communicate effectively in oral and writing scenarios.

4. Graduates will be able to design and create new beer recipes from grain to glass and be able to confirm with appropriate analytical techniques that they made what they intended to make.

These goals will be assessed over the following courses based on the following outcomes/ assessments:

Bloom's Taxonomy



Student Learning Outcome 1. Students will demonstrate theoretical foundational knowledge of core/ foundational brewing science topics such as but not limited to the physical, chemical, microbiological aspects of beer production as well as the sensory analysis of raw materials and different beer styles. Students will also show that they are aware of the historical, legal, and economic aspects brewing.

A. Cumulative Assessment Test

A comprehensive final exam will be administered in FDSC 45203/55203 – Brewing Science. The test will include questions from required brewing core content based on international brewing standards such as the Institute for Brewing and distilling. The post-test will be scored and will serve as a direct measure of a student's theoretical success in brewing science.

B. Acceptable and Ideal Targets (not required for indirect measures).

We would expect an acceptable score for the comprehensive final to be greater than or equal to 70%, an ideal (meets expectations) score to be greater than or equal to 80%, and an excellent score to be greater than or equal to 90%. A nonacceptable score would be < 70%. We will report on the students performing at each of these levels.

C. Key Personnel

Dr. Scott Lafontaine, Food Science Department, Assistant Professor,
scottla@uark.edu

Student Learning Outcome 2. Students will develop practical and critical-thinking skills which they apply to issues in the brewing industry. Students will demonstrate these skills through written and oral communication after they have completed their internship/special problems core requirement. This will be done through an oral presentation and a written report which are required after special problems or internship. This Learning Outcome uses rubrics as the direct measure.

A. Rubrics for BREWCP Internship/Special Problems

Two rubrics, an oral presentation rubric and written communication rubric, will be used to evaluate the oral presentation and written reports from the student internship/special problem.

B. Acceptable and Ideal Targets (not required for indirect measures).

For the Internship/Special Problems rubrics written (25 total); oral (28 total), it is expected that an acceptable score to be a 17.5/25; 19.6/28, an ideal (meets expectations) score to be 20/25; 22.4/28, and exceeding expectations to be 22.5/25; 25.2/28. A nonacceptable score would be < 17.5/ 25; 19.6/28. We will report on the students performing at each of these levels.

C. Key Personnel (Department Head, Faculty, Department Administrative Manager).
Dr. Renee Threlfall, Research Scientist (rthrelf@uark.edu) and Dr. Scott Lafontaine, Assistant Professor (scottla@uark.edu)

6. Certificate of Proficiency in Brewing Science Exit Survey

- The Exit Survey is given to students during their final year in the certificate program.
- Self-reported competency levels are included.
- The survey is an indirect measure.

Dr. Renee Threlfall, Research Scientist (rthrelf@uark.edu) and Dr. Scott Lafontaine, Assistant Professor (scottla@uark.edu)

Student Learning Outcome 3. During their capstone brewing project students will design/ create, brew, and analyze a beer from grain to glass in BREW 45703/55703 Production design and analysis of Beer. Students will demonstrate these skills and present their finished beer in a oral and poster presentation to academic and industry professionals at the end of BREW 45703/55703 Production design and analysis of Beer. Learning outcome uses rubrics as the direct measure.

A. Rubrics for BREW 45703/55703 Production design and analysis of Beer

Two rubrics, an oral presentation rubric and poster rubric, will be used to evaluate the oral presentation and poster from the brewing project in BREW 45703/55703.

B. Acceptable and Ideal Targets (not required for indirect measures).

Poster (120 total); Oral (120 total), it is expected that an acceptable score to be a 84/120, an ideal (meets expectations) score to be 96/120, and exceeding expectations to be 108/120. A nonacceptable score would be < 84/120. We will report on the students performing at each of these levels.

C. Key Personnel (Department Head, Faculty, Department Administrative Manager).
Dr. Scott Lafontaine, Assistant Professor (scottla@uark.edu)

6. Certificate of Proficiency in Brewing Science Exit Survey

The Exit Survey is given to students during their final year in the certificate program.

- Self-reported competency levels are included.
- The survey is an indirect measure.

Dr. Scott Lafontaine, Assistant Professor (scottla@uark.edu)

7. Supporting Attachments

Cumulative assessment Example

Internship Oral Presentation Rubric

Internship Written Communication Rubric

BREW 45703/55703 Oral presentation

BREW 45703/55703 Poster presentation

Exit Survey

Example Cumulative Assessment Test FDSC 45203/55203 – Brewing Science

Multiple choice questions – circle the correct answer.

1. What is the primary goal of steeping in the malting process?
 - a. Production of a rootlet.
 - b. **Achieving a desired moisture content in the barley prior to germination.**
 - c. Development of enzymes by the aleurone layer.
 - d. Creating precursors for flavor development.
 - e. All of the above.
2. How long does the malting process typically take?
 - a. 3 days.
 - b. 5 days.
 - c. **7 days.**
 - d. 9 days.
 - e. 11 days.
3. What is the correct sequence of events during the malting process?
 - a. Blending > Steeping > Germination > Kilning > Cleaning
 - b. Steeping > Blending > Kilning > Germination > Cleaning
 - c. Cleaning > Germination > Steeping > Kilning > Blending
 - d. Germination > Kilning > Steeping > Cleaning > Blending
 - e. **Cleaning > Steeping > Germination > Kilning > Blending**
4. What is the advantage of steam-conditioned milling?
 - a. It makes the malt easier to mill.
 - b. **It makes the malt husk more pliable.**
 - c. It allows adjunct and malt to be milled together.
 - d. It compensates for poor quality malt.
 - e. It allows grain without husks, such as wheat, to be more easily milled.
5. When using rice or corn grits why are they boiled separately prior to mixing with the main malt mash?
 - a. Boiling separately speeds the wort production step(s) in the brew house.
 - b. Boiling inactivates the endogenous enzymes in the rice and /or corn.
 - c. **Boiling for an extended period time fully gelatinizes the starch in the rice/corn grits.**
 - d. Boiling the entire mash together (rice/corn plus malt) would cause pasting of the mixture.
 - e. Boiling, like decoction, is a carryover from historical brewing practices and is used for historical and/or brewer-preference reasons because of the perceived flavor contribution that comes from boiling.
6. Consider a 100% barley malt mash. What is a reasonable level of fermentability you might expect from wort produced using a single temperature infusion mashing regime at (60°C) with typical, commercial pale malt?
 - a. 100% fermentable
 - b. 90% fermentable
 - c. **70% fermentable**
 - d. 50% fermentable

- e. 30% fermentable
7. What is the primary reason for using an internal calandria to boil wort relative to using a direct-fired or steam-jacketed kettle?
- a. **To increase the amount of available heat transfer area.**
 - b. To be able to start heating wort before the kettle is full.
 - c. To prevent scorching of the heat transfer surface.
 - d. To improve ease of maintenance.
 - e. To help with trub formation.
8. Comparing copper with stainless steel in terms of heat transfer media, which one of the following is a **not** feature of copper?
- a. Copper has higher thermal conductivity.
 - b. Copper has higher wettability.
 - c. Copper has lower mechanical strength.
 - d. **Copper is easier to clean.**
9. What is an optimal temperature difference between a heating surface and wort for the most effective and efficient boiling?
- a. 2°C
 - b. 5°C
 - c. **25°C**
 - d. 40°C
 - e. 80°C
10. Which one of the following answers may result in high levels of DMS in boiled wort?
- a. Using malt that has been kilned at higher temperatures.
 - b. Quick whirlpool process.
 - c. Maintaining vigorous wort boiling conditions.
 - d. **Evaporation rate that does not exceed 3%.**
 - e. Using a wort stripper prior to wort cooling.
11. Approximately how much of the US hop crop is grown in Washington?
- a. 17%
 - b. 34%
 - c. 51%
 - d. **75%**
 - e. 92%
12. Which one of the following hop components contributes the most to the bitterness of beer?
- a. Alpha acids.
 - b. **Iso-alpha acids.**
 - c. Beta acids.
 - d. Oxidized beta acids.
 - e. Humulene.
13. What is approximately the highest hop utilization one can expect to achieve when using a single addition of standard pellet hops at the beginning of a 60 minute boil?
- a. 5%
 - b. 20%
 - c. **35%**
 - d. 50%
 - e. 65%
14. Which one of the following steps differentiates Type 45 hop pellets from Type 90 hop pellets?

- a. **Type 45 pellets are sieved to remove hop material and concentrate the lupulin.**
- b. Type 45 pellets are dried to a greater extent thereby increasing the relative amount of lupulin in the final pellet.
- c. Type 45 pellets contain magnesium oxide, which increases the amount of iso-alpha acids in the finish pellet.
- d. Type 45 pellets are made from super alpha hops while Type 90 are made from lower alpha, aroma hops.
- e. None of the statements are correct regarding differences between Type 45 and Type 90 pellets.
15. What is the typical range of oil in hops?
- a. **0.5 – 3 ml/100 g**
- b. 3 – 6 ml/100 g
- c. 6 – 9 ml/100 g
- d. 9 – 12 ml/100 g
- e. 12 – 15 ml/100 g
16. Methylene blue stain is used to measure which yeast property?
- a. **Viability.**
- b. Vitality.
- c. Total cell number.
- d. Presence of bacteria.
- e. Budding index.
17. What is an appropriate pitching rate of viable yeast cells to start a fermentation in 10°P wort?
- a. 10^5 cells/ml
- b. 10^6 cells/ml
- c. **10^7 cells/ml**
- d. 10^8 cells/ml
- e. 10^9 cells/ml
18. Which of the following is most likely to result in poor fermentation performance?
- a. **Low yeast viability**
- b. High pitch rate
- c. Higher than desired wort temperature
- d. High wort dissolved oxygen
- e. Low wort BU's
19. Estimate the time it takes to start with a single loopful of yeast from a slant and have enough yeast to pitch a 1000 hL fermentation.
- a. 3 days
- b. 5 days
- c. 7 days
- d. **14 days**
- e. 28 days
20. What is the most abundant ester formed during a beer fermentation?
- a. Ethyl octanoate.
- b. Isoamyl acetate.
- c. **Ethyl acetate.**
- d. 3 methyl butyl acetate.
- e. 2 phenyl ethanol.
21. At approximately what temperature does beer have maximal density?
- a. 1°C
- b. 0°C

- c. 1°C
- d. 2°C
- e. 3°C

22. Haze in beer can be produced by...?

- a. Suspended yeast.
- b. Bacterial infection.
- c. Colloidal interaction of protein and polyphenols.
- d. **All of the above, a, b & c.**

23. Which of the following products is used for pre-coating a beer filter?

- a. **Perlite.**
- b. Isinglass.
- c. PVPP.
- d. Silica gel.
- e. Tannic acid.

24. Which species of common beer spoilage organisms produces lactic acid and depending on species may also produce acetic acid, ethanol and carbon dioxide?

- a. *Brettanomyces*.
- b. ***Lactobacillus*.**
- c. *Pediococcus*.
- d. *Acetobacter*.
- e. *Citrobacter*.

25. During the bottle/can filling operation, oxygen pickup should be kept as low as possible. What is a maximum oxygen pickup that breweries with modern fillers shoot for?

- a. < 4 ppb
- b. **< 40 ppb**
- c. < 400 ppb
- d. < 4 ppm
- e. < 40 ppm

26. Which of the following packaging operations has the lowest operational capacity?

- a. Depalletizer.
- b. Empty bottle inspector.
- c. **Filler.**
- d. Pasteurizer.
- e. Case packer.

True / False questions – Circle the correct answer

27. A whirlpool hop separator can be used to separate hops from hopped wort regardless of whether they are whole or pelletized.

- a. True.
- b. **False.**

28. Hops are a diecious plant - there are male and female hop plants.

- a. **True.**
- b. False.

29. Commercial hop farms grow hops. Once the hops vines are cut they are sent to a separate hop processor (hop company) for picking, drying and baling.

Internship/ Special Problems Oral Presentation Rubric

Student's Name: _____

Max points=28

Date: _____

Title: _____

Reviewer's Name: _____

Oral Presentation Rubric

| TRAIT | 1 | 2 | 3 | 4 |
|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| NONVERBAL SKILLS | | | | |
| Maintains good eye contact and rapport with audience without excessive use of notes. | No eye contact with audience, as entire report is read from notes. <input type="checkbox"/> | Displayed minimal eye contact with audience, while reading mostly from the notes. <input type="checkbox"/> | Consistent use of direct eye contact with audience, but still returns to notes. <input type="checkbox"/> | Holds attention of entire audience with the use of direct eye contact, seldom looking at notes. <input type="checkbox"/> |
| Exhibits good body language that enhances the presentation. | No movement or descriptive gestures. <input type="checkbox"/> | Very little movement or descriptive gestures. <input type="checkbox"/> | Made movements or gestures that enhances articulation. <input type="checkbox"/> | Movements seem fluid and help the audience visualize. <input type="checkbox"/> |
| Controls anxiety to present a relaxed presentation without verbal errors. | Tension and nervousness is obvious; has trouble recovering from mistakes. <input type="checkbox"/> | Displays mild tension; has trouble recovering from mistakes. <input type="checkbox"/> | Makes minor mistakes, but quickly recovers from them; displays little or no tension. <input type="checkbox"/> | Student displays relaxed, self-confident nature about self, with no mistakes. <input type="checkbox"/> |

COMMENTS:

| VERBAL SKILLS | | | | |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| Speaks clearly with confidence, enthusiasm and authority. | Does NOT speak clearly with confidence, enthusiasm and authority. <input type="checkbox"/> | SOMETIMES speaks clearly with confidence, enthusiasm and authority. <input type="checkbox"/> | OFTEN speaks clearly with confidence, enthusiasm and authority. <input type="checkbox"/> | ALWAYS speaks clearly with confidence, enthusiasm and authority. <input type="checkbox"/> |

COMMENTS:

| CONTENT | | | | |
|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| The presentation is concise, clear, logical and includes all the requested elements. | The presentation is NOT concise, clear, logical and does not include all the requested elements. <input type="checkbox"/> | SOME of the presentation is concise, clear, logical and includes some of the requested elements. <input type="checkbox"/> | MOST of the presentation is concise, clear, logical and includes most of the requested elements. <input type="checkbox"/> | The presentation is CONSISTENTLY concise, clear, logical and includes all the requested elements. <input type="checkbox"/> |
| Slides are clear, well organized with appropriate use of color and effects. | Slides are NOT clear or well organized and lack appropriate use of color and effects. <input type="checkbox"/> | SOME of the slides are clear and well organized and there is some appropriate use of color and effects. <input type="checkbox"/> | Slides are MOSTLY clear and well organized and most contain appropriate use of color and effects. <input type="checkbox"/> | Slides are CONSISTENTLY clear, well organized with appropriate use of color and effects. <input type="checkbox"/> |
| Effectively answers related questions. | Effectively answers NONE of the related questions. <input type="checkbox"/> | Effectively answers SOME of the related questions. <input type="checkbox"/> | Effectively answers MOST of the related questions. <input type="checkbox"/> | Effectively answers ALL related questions. <input type="checkbox"/> |

COMMENTS:

Internship/ Special Problems Written Report Rubric

Student's Name:

Max points=25

Date:

Title:

Reviewers Name:

Written Report Rubric

| | 2 | 3 | 4 | 5 |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Company Background | Minimal overview of the company. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> | Incomplete overview of the company. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> | Concise overview of the company with limited history, products/services and customer base. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> | Concise overview of the company including history, products/services and customer base. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> |
| Internship Description | Description of internship duties is poorly organized and lacks details. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> | Description of internship duties includes minimal details and is somewhat organized. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> | Description of internship duties is presented in an organized fashion and includes a moderate amount of detail. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> | Presents internship duties in a detailed, but concise, logical and organized fashion. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> |
| Application of classroom into "real world" | No understanding of how principles learned in the classroom were applicable to the internship. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> | Minimal attempt to evaluate how principles learned in the classroom can be applied to this internship experience. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> | Some evaluation of how principles learned in the classroom can be applied to this internship experience. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> | Thoughtful evaluation of how principles learned in the classroom can be applied to this internship experience. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> |
| Contribution to future career | Minimal insight with little or no explanation on how and why the internship could contribute to future career decisions and opportunities. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> | Weak insight with little explanation on how and why the internship could contribute to future career decisions and opportunities. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> | Some insight including explanations on how and why the internship could contribute to future career decisions and opportunities. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> | Strong insight including explanations on how and why the internship could contribute to future career decisions and opportunities. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> |
| Spelling and Grammar | Extensive spelling and grammatical errors. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> | Some spelling and grammatical errors. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> | No spelling errors but some grammatical errors. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> | No spelling or grammatical errors. <input style="float: right; width: 20px; height: 20px;" type="checkbox"/> |

Comments:

Rubric for Oral Communication - Brewing Project Presentation BREW 45703/55703 Production design and analysis of Beer

| Criteria | Ratings | | | Pts |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Content (20%) | <p align="center">24.0 to >16.0 pts</p> <p>Excellent - Topic is well developed, effectively supported and appropriate for the assignment. Effective thinking is clearly and creatively expressed.</p> | <p align="center">16.0 to >8.0 pts</p> <p>Acceptable - Topic is evident with some supporting details; generally meets requirements of assignment.</p> | <p align="center">8.0 to >0 pts</p> <p>Poor - Topic is poorly developed. Supporting details absent or vague. Trite ideas and/or unclear wording reflect lack of understanding of topic and audience.</p> | 24 pts |
| Organization (20%) | <p align="center">24.0 to >16.0 pts</p> <p>Excellent - Oral presentation is clearly organized with effective introduction and conclusion. Each segment relates to the others according to a carefully planned framework.</p> | <p align="center">16.0 to >8.0 pts</p> <p>Acceptable - Oral presentation demonstrates some grasp of organization with a discernible theme and supporting details.</p> | <p align="center">8.0 to >0 pts</p> <p>Poor - Oral presentation is rambling and unfocused, with main theme and supporting details presented in a disorganized unrelated way.</p> | 24 pts |
| Delivery (20%) | <p align="center">24.0 to >16.0 pts</p> <p>Excellent - Speaker uses appropriate language. Smooth, effective delivery. Good voice control, eye contact, and physical demeanor. Restates and summarizes appropriately.</p> | <p align="center">16.0 to >8.0 pts</p> <p>Acceptable - Speaker appears proficient with language, vocal and physical expression.</p> | <p align="center">8.0 to >0 pts</p> <p>Poor - Speaker appears unpracticed. Unnecessary pauses, filler words. Problems with voice control, eye contact, or posture. Incorrect or inappropriate language.</p> | 24 pts |
| Use of Visual Aids (10%) | <p align="center">12.0 to >8.0 pts</p> <p>Excellent - The presenter refers to and explains visual aids at appropriate moments in the presentation.</p> | <p align="center">8.0 to >4.0 pts</p> <p>Acceptable - Speaker occasionally uses visual aids but use is inconsistent or confusing.</p> | <p align="center">4.0 to >0 pts</p> <p>Poor - Speaker makes no mention of visual aids in the presentation</p> | 12 pts |
| Responsiveness to Audience (30%) | <p align="center">36.0 to >24.0 pts</p> <p>Excellent - Stimulates questions. Responds to questions with critical thinking and knowledge beyond data in audiovisuals.</p> | <p align="center">24.0 to >12.0 pts</p> <p>Acceptable - Generally responsive to questions. May not provide correct answers, but attempts to supply information.</p> | <p align="center">12.0 to >0 pts</p> <p>Poor - Poor - Doesn't understand questions. Responds poorly to questions.</p> | 36 pts |
| Total Points: 120 | | | | |

Suggestions and guidelines for group poster presentation BREW 45703/55703 Production design and analysis of Beer

The final stage of the BREW 45703/55703 Production design and analysis of Beer brewing project is to prepare a poster that captures the project objective(s), methodology, results and conclusions. Your poster should include an Introduction, Materials and Methods, Results, Conclusions and Learnings sections and should include the information below as well as any other relevant information. It should be designed and written with technical sophistication suitable for display at an industry/professional meeting. Several poster templates to work from will be provided to you. You will have the opportunity to present the poster and your beer at the Spring District Great Plains MBAA meeting.

Beer Styles

Target Description

- OG, AE, Color, IBUs and ABV
- Brief info/background on style

Process Specifications

- Forced fermentations
- Graph of daily fermentation monitoring (Gravity vs. Time)
- Wort color
- Wort pH
- Wort BUs
- Original Gravity
- Water chemistry
- Malt bill/mashing procedure
- Hopping regime

Beer Specifications

- RDF, ADF, AE, RE
- Bitterness
- Beer color
- Carbonation level/pressure
- Packaged gas level
- Percent Alcohol v/v and w/W
- Kcal per 12 oz. serving from alcohol
- Kcal per 12 oz. serving from carbohydrates
- Total kcal per 12 oz. serving

Research Projects

Project Background

Experimental Design

Process Specifications

- Target OG, AE, Color, IBUs and ABV
- Forced fermentations
- Graph of daily fermentation monitoring (Gravity vs. Time)
- Wort color
- Wort pH
- Wort BUs
- Original Gravity
- Water chemistry
- Malt bill/mashing procedure
- Hopping regime

Experimental Results

- RDF, ADF, AE, RE
- Bitterness
- Beer color
- Other applicable Beer Specs
- May have additional analytical and/or sensory results

References

Rubric for Poster Communication in BREW 45703/55703 Production design and analysis of Beer

Instructor _____ Course _____ Date _____ Student: _____ Total Points: _____

| | Poor | Acceptable | Excellent |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Content 30% | Details on the poster are too general, incomplete or have little to do with the main topic. The audience needs more information to understand; does not meet assignment requirements. 0 – 12 points | Details on the poster include important information but the audience may need more information to understand fully; generally meets requirements of the assignment. 13 – 24 points | Details on the poster capture the important information about the topic and increase the audience’s understanding; effectively meets requirements of the assignment 25 – 36 points |
| Use of Graphics 15% | Graphics do not relate to the topic or are inappropriate for a technical poster display. 0 – 6 points | All graphics are related to the topic, appropriate and most make it easier to understand. 7 – 12 points | All graphs are related to the topic, appropriate and make it easier to understand. 13 – 18 points |
| Organization 20% | The information appears to be disorganized and/or does not use poster template provided. 0 – 8 points | Information is missing or rearranged in a way that does not help the reader understand the topic within the poster template provided. 9 – 16 points | Information is very organized within the poster template provided. 17 – 24 points |
| Layout and Design 15% | Much of the information on the poster is unclear to too small to be read from a distance. 0 – 6 points | All information on the poster is in focus and can be easily viewed and identified from 4 ft. away. 7 – 12 points | All information on the poster is in focus and can be easily viewed and identified from 6 ft. away. 13 – 18 points |
| Mechanics 10% | Many grammatical, spelling or punctuation errors. 0 – 4 points | A few grammatical, spelling or punctuation errors. 5 – 8 points | No grammatical, spelling or punctuation errors. 9 – 12 points |
| Bibliography 10% | Sources are not documented. 0 – 4 points | Most sources are accurately documented. 5 – 8 points | All sources are accurately documented. 9 – 12 points |

Adapted from NCTE/IRA ReadThinkWrite Materials, 2006

Certificate of Proficiency in Brewing Science Exit Interview

Date _____ Name _____

Address, City, Zip: _____

Email: _____ Telephone: _____

Why did you enroll in the Certificate of Proficiency in Brewing Science?

Which term and year did you enroll?

What class did you like the most and why?

What class did you like the least and why?

Do you feel prepared for the work force?

Have you accepted a job or are currently employed?

In the job related to the brewing industry?

Please give company name and location.

What was your starting salary?

Indicate your level of satisfaction with the supervision and guidance you received from your advisor (check one)

| Low or poor | Below average | Average | Above average | Excellent |
|--------------------|----------------------|----------------|----------------------|------------------|
| | | | | |

My GPA for the classes that I took for this program was (check one)

| 2.00 to 2.49 | 2.50 to 2.99 | 3.00 to 3.49 | 3.50 to 4.00 |
|---------------------|---------------------|---------------------|---------------------|
| | | | |

Please rate your level of general competence in the following areas on a scale of 1 to 5 (1 = I don't feel competent in this area; 5 = I feel competent in this area)

| Area of Competence | Score (1 to 5) |
|--------------------------------------------|-----------------------|
| History of brewing | |
| Beer production process | |
| Sanitation during beer production | |
| Analysis of beer quality | |
| Economics of beer production | |
| Microbiology of beer production | |
| Legal aspects of beer production and sales | |
| Sensory analysis of beer | |
| Leadership ability | |
| Written communication | |
| Oral communication | |
| Critical thinking/problem solving skills | |
| Laboratory skills | |
| Creativeness | |
| Professionalism | |

Do you have additional questions or comments?