

Meeting time: 12:30-4:00PM, M,T,W,R,F

Meeting Place: Mulvane 124

Professor: Dr. Scott A. Kimball
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Phone: 785.594.4563
Office: Mulvane 229
Office hours: by appointment



Course Description:

This course will provide a unique opportunity for an intimate look at the science behind one of humanity's most ancient and multicultural manufactured food products by introducing students to the biology, ecology, chemistry, and physics of the art and science of beer. We will discuss the diversity of botanical origins of typical beer ingredients, explain the ecological and physical principles at work in the brewing environment, and present the production of beer from a biochemical perspective. Beer styles will be explored from the perspective of the biological and chemical processes that produce differences in stylistic characteristics as a consequence of the cultures that developed and refined them. *Prerequisite: none.*

Required Text:

- Bamforth, C. 2009. Beer: Tap into the art and science of brewing, 3rd ed. Oxford University Press, New York, NY. 239 pp.

Course Objectives:

Students completing this course should be able to:

- Identify and describe the natural history of the species of plants, fungi, and bacteria that are used to produce common contemporary and historical beer styles.¹
- Explain the role of each beer ingredient in the production of specific beer qualities.
- Describe the ecology of the brewing environment and how it promotes and limits population growth of yeasts.
- Explain the basic physical principles that contribute to beer production.
- Describe the biochemical products and pathways that lead to alcohol production.
- Identify and describe the role of enzymes responsible for the conversion of whole plant ingredients to the constituent components of beer.
- Describe how various beer-consuming cultures utilize local species in beer production.²
- Identify and describe the most common beer styles and the cultures that are responsible for their origination.²

Grading:

This course is graded as pass/fail, so full participation in course activities will determine your success. Students are expected to prepare for class by reading assigned sections of the text and additional materials as indicated ahead of class. Students will lead occasional topical discussions. Failure to participate in at least 70% of activities will constitute course failure.

¹This objective meets the second condition of the Interterm Mission Statement to "increase appreciation for diversity in life".

²This objective meets the first condition of the Interterm Mission Statement to "improve cultural awareness and knowledge".

Attendance/Make-up Policy:

Attendance is mandatory, but because this course is graded as Pass/Fail, there is no make-up work for missed classes. However, failure to participate in >70% of course activities will result in a failing grade.

Students with Disabilities:

Baker University is committed to providing “reasonable accommodations” in keeping with Section 504 of the Rehabilitation Act and the Americans with Disability Act of 1992. Access Services coordinates accommodations and services for all eligible students with disabilities. If you have a disability and wish to request accommodations and have not contacted Access Services, please do so as soon as possible. Access Services is located on the Baldwin City campus in the Office of Student Academic Success (in Collins Library (lower level); 785-594-8352; sas@bakeru.edu). Information about Access Services can also be found at www.bakeru.edu/sas. If accommodations have been approved by Access Services, please communicate with your professor(s) regarding your accommodations to coordinate services.

Academic Honesty:

Students are expected to take responsibility for their own work and provide appropriate credit to the authors of works used by the student to complete course work. Please review the student handbook for a full description of the University’s policy on academic misconduct.

From the Student Handbook: Baker University expects students and professors to have solely completed or prepared the work or research that bears their name, and to acknowledge the materials and sources of others.

Students

1. Have the responsibility to do their own academic work.
2. Must acknowledge sources of their materials and material that is the work of others.
3. Have the responsibility to inquire of the professor when they are uncertain as to what constitutes proper acknowledgment.
4. Have the responsibility to inquire of the professor as to what materials and aids are permitted in testing and research work.
5. Have an obligation to know their rights and responsibilities as delineated in the Baker University Student Handbook.
6. Have the responsibility to know the University’s position with respect to academic misconduct as set forth in [the student handbook].

Credit Hour Definition and Associated Course Expectations: Consistent with best practices in higher education, Baker University subscribes to the federal definition of the “credit hour” endorsed by the Higher Learning Commission. Driven by intended learning outcomes and verified by evidence of student achievement, the “credit hour” is an institutionally-established equivalency that reasonably approximates not less than one hour of classroom (or direct faculty) instruction and a minimum of two hours of out-of-class student work per week for the duration of the course enrollment period. A 3-credit-hour course, for example, requires approximately 45 classroom contact hours, roughly 90 out-of-class work hours and approximately 135 total instructional hours over the course of a 15-week semester. Out-of-class assignments may include: a) assigned text readings, b) reading-related exercises and associated Moodle forum postings, c) unit evaluation and exam preparation, d) course-related assignments, e) homework problems, and f) literature review research and manuscript preparation.

Topic Schedule (subject to change):

<u>Dates</u>	<u>Subject</u>	<u>Text Reading</u>
Jan 6	Beer: What it is, what it isn't, and why it matters. Carbohydrates and Proteins: Did someone say polymer?	Bamforth Ch. 1 & Appendix
Jan 7	Barley (<i>Hordeum vulgare</i>): A grass seed in fact!	Bamforth Ch. 2 & 5
Jan 8	Malting: Germination and enzymatic digestion of starch	Bamforth Ch. 2 & 5
Jan 9	Mashing: Enzymatic production of sugar Lautering: Solutions, suspensions, and colloids Hops (<i>Humulus lupulus</i>): A most wicked and pernicious weed.	Bamforth Ch. 8 & 7
Jan 10	Field Trip #1!	Bamforth Ch. 8
Jan 13	Yeast (<i>Saccharomyces cerevisiae</i>): There's a fungus among us!	Bamforth Ch. 9
Jan 14	Boiling: α and β acids (that is to say...flavor) Aromatic Botanicals: I'll smell you later!	Bamforth Ch. 7
Jan 15	Anaerobic Ethanol Fermentation: Life in the absence of oxygen.	Bamforth Ch. 9
Jan 16	Principles of Foam Formation: It all comes to a head.	Bamforth Ch. 4 & 11
Jan 17	Field Trip #2!	
Jan 21	Ales versus Lagers: We're stylin'.	Bamforth Ch. 3
Jan 22	Lambics: Beer gone wild! Weißbier: Say what? Say wheat!	Bamforth Ch. 3
Jan 23	Field Trip #3!	

Field Trips: (student should plan for an extended class period for each of these field trips)

Field Trip #1: We will visit with the brewers at a local brewery – site TBD.

Field Trip #2: We will visit a local hops-producing farm – site TBD, to learn about the production of hops as a crop, the history of hops production in the Kansas City region, and the wild, naturalized hops that grow locally. From the hop farm, we will visit a local brewery – site TBD.

Field Trip #3: We will visit with the microbiologist, analytical chemist, and sensory analysts at Boulevard Brewing to learn more about the laboratory and investigative skills required to grow and select yeast and bacteria cultures for brewing and the detection and deterrence of unwanted microbes in the brewing environment.