Class Schedule
Lecture: 3 hours
Lab: 6 hours in Jett Hall on alternating Saturdays

Instructors
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Catalog Description
Details of beer production, fermentation science, brewery operation, and process design & economics. Engineering considerations including process safety, fermentation kinetics, unit operations, and economies of scale. Beer styles, recipe formulation, product quantification for tax purposes, and brew analytical methods will also be discussed. 4 credits (3 + 3P).

Pre-requisites
- CHME 441 and CHME 452.

Textbook (required)

Topics Covered
- Starchy Raw Materials
- Hops
- Brew Water
- Yeast
- Malting
- Wort Production
- Fermentation, Maturation, Storage
- Balling's equation
- Monod kinetics
- Filtration and Stabilization
- Gluten Free Beer
- Lambic, Gueuze and Fruit Lambic
- Filling
- Properties and Quality
- Stability of Beer
- Analysis and Quality Control
- Automation
- Malthouse and Brewery Planning
- Cleaning and Disinfecting
- Energy
- Federal, State and Local Beer and Alcohol Regulations
- Economic analysis & Economies of Scale
Team-Based Learning
This course uses the team-based learning method. Most of the content is introduced outside of class as readings and pre-application exercise problems (Pre-Apps), and most of the application activities, conventionally done as homework and outside-of-class group projects, are done in teams during class. Teams will be determined the first day of class and will remain together the whole semester. To ensure that students complete the readings and are prepared with basic knowledge to do the in-class application exercises, quizzes are taken by individuals and then by teams. (For more information about the team-based learning strategy, please see www.teambasedlearning.org)

Assigned Readings and Reading Guides
Except for exam days, there will be assigned reading for every two class meetings. I will strive to keep every reading assignment under 20 pages and will provide a written reading guide for each reading assignment. Reading guides and any reading assignments from outside of the textbook will be available through Canvas. I put a lot of thought into selecting each reading and preparing each reading guide; I, and your teammates, will expect you to have done the readings before class.

Exams
There will be two one-hour mid-term exams and a two-hour final exam during finals week. Exams will be mostly short-answer questions on concepts and relative magnitudes, with one or two calculation questions. The final exam is cumulative and will mostly cover material since the 2nd mid-term exam. Prior (at a week) approval from me, or a certified medical/family excuse, is needed to make up a missed exam. Exams are open-book, open-notes, but closed-computer so plan accordingly.

Laboratory “Brew Days”
Over the course of the semester, we will meet every other Saturday for 6 hour “brew days”. On the first brew day, we will introduce the unit operations and practice disassembling, cleaning, and assembling all of the equipment. For brew days 2, 3 and 4, we will brew a lighter, lower-alcohol beer, first using a standard recipe, then experimenting with different ingredients, then brewing an “improved” version. For brew days 5, 6 and 7, we will brew a “big” beer, again first from a standard recipe, then experimenting with different ingredients, and then the “improved” version. The final brew day will consist of final brewery clean-up and beer sampling.

Common Syllabus Addendum
Additional policies can be found in the Chemical & Materials Engineering Department’s common syllabus addendum: http://chme.nmsu.edu/academics/syllabi/chme-common-syllabus-addendum/.

Syllabus Preparation Date
• 9/9/16