

ORIGINATOR'S SECTION:

1. College: CHABSS CoBA CoEHHS CSM
 Desired Term and Year of Implementation (e.g., Fall 2008):
 Fall 2018

2. Course is to be considered for G.E.? (If yes, also fill out appropriate GE form*) Yes No

3. Course will be a variable-topics (generic) course? Yes No
 ("generic" is a placeholder for topics)

4. Course abbreviation and Number:* ENGB 500

5. Title: (Titles using jargon, slang, copyrighted names, trade names, or any non-essential punctuation may not be used.)
Brewing Science I

6. Abbreviated Title for PeopleSoft:
 (no more than 25 characters, including spaces)
 Brewing Science I

7. Number of Units: 3

8. Catalog Description: (Not to exceed 80 words; language should conform to catalog copy. Please consult the catalog for models of style and format; include all necessary information regarding consent for enrollment, pre- and/or corequisites, repeated enrollment, crosslisting, as detailed below. Such information does not count toward the 80-word limit.)

 Explores the physical, chemical, and biochemical changes that occur during the following stages of the brewing process: malting (steeping, germination, kilning, roasting), milling, mashing, lautering/extracting, boiling/sterilizing, adding hops, and fermentation. Prerequisites: ENGB 401.

9. Why is this course being proposed?

 This course is one of the core courses of the Brewing Science Certificate in the Engineering™ Certificate program.

10. Mode of Instruction*
 For definitions of the Course Classification Numbers:
http://www.csusm.edu/academic_programs/curriculum/schedule/catalog/curricula/DOCUMENTS/Curricular_Forms_Tab/Instructional%20Mode%20Conventions.pdf

Type of Instruction	Number of Credit Units	Instructional Mode (Course Classification Number)
Lecture	3	C2
Activity		
Lab		

11. Grading Method:*
 Normal (N) (Allows Letter Grade +/-, and Credit/No Credit)
 Normal Plus Report-in-Progress (NP) (Allows Letter Grade +/-, Credit/No Credit, and Report-in-Progress)
 Credit/No Credit Only (C)
 Credit/No Credit or Report-in-Progress Only (CP)

12. If the (NP) or (CP) grading system was selected, please explain the need for this grade option.

13. Course Requires Consent for Enrollment? Yes No
 Faculty Credential Analyst Dean Program/Department - Director/Chair

14. Course Can be Taken for Credit More than Once? Yes No
 If yes, how many times? (including first offering)

15. Is Course Crosslisted: Yes No
 If yes, indicate which course and check "yes" in item #22 below.

16. Prerequisite(s): Yes No ENGB 401

17. Corequisite(s): Yes No

18. Documentation attached:

* If Originator is uncertain of this entry, please consult with Program/Department Director/Chair.



Trulcer _____
 RP _____
 PS _____

ENGB 500 – Brewing Science I
(PROSPECTIVE COURSE OUTLINE/SAMPLE SYLLABUS)
Spring, 2018 CN XXXXX
Time: TBD Location: TBD

Instructor TBD

Email TBD

Office TBD

Best contact number TBD

Course Description: This course explores the physical, chemical, and biochemical changes that occur during the following stages of the brewing process: malting (steeping, germination, kilning, roasting), milling, mashing, lautering/extracting, boiling/sterilizing, adding hops, and fermentation.

Student Learning Outcomes:

Upon successful completion of the course, students will be able to:

1. Explain the important (bio)chemical transformations that happen at each step of the brewing process.
2. Understand and be able to use standardized terms, analytical tools, assays, and units of measure for monitoring the various physical, chemical, and (bio)chemical transformations that happen at each step of the brewing process.
3. Explain how operational parameters (time, temperature, humidity, exposure to light, exposure to oxygen, etc) influence these transformations and alter the final chemical composition, taste, appearance, and aroma of beer.
4. Explain how problems can arise during the various stages of the brewing process and propose viable preventative measures to avoid such problems or solutions to fix them should they occur.

Prerequisites: ENGB 350 and 401

Textbooks:

Ockert, Karl. "Raw Materials and Brewhouse Operations. Vol. 1 of MBAA Practical Handbook for the Specialty Brewer." Published by Master Brewers Association of America, 2006.

Hieronymous, Stan. "For the Love of Hops: The Practical Guide to Aroma, Bitterness, and the Culture of Hops." Brewers Publications, 2012.

Mallett, John. "Malt: A Practical Guide from Field to Brewhouse." Brewers Publications, 2014.

White, Chris. Zainasheff, Jamil. "Yeast: a Practical Guide to Beer Fermentation." Brewers Publications 2010

Course Activities:

Homeworks: Approximately 9 homeworks worth 15 points each will include reading guides, activities, and review exercises.

Quizzes: Three quizzes will be included to allow demonstration of mastery of each major section of the course. These quizzes will be worth 50 points each.

Tests: Mid-term worth 100 points and final exam worth 150 points.

Project: Each student will be given a malt analysis datasheet and be asked to decide what type of beer to make using this particular starting material. They will present a proposed protocol (including parameters for milling, mashing, lautering, boiling/sterilizing, adding hops, and finally initializing fermentation) for the brew. A paper describing the proposals will satisfy the All-University Writing Requirement. Each student will also present their work to the class.

Grading Scheme:

# points	Grade		# of Items	Pts. Per Item	Total Points
549 and up	A	Homework	8	15	120
540-548	A-	Quizzes	3	50	150
531-539	B+	Project	1	80	80
489-530	B	Midterm Exam	1	100	100
480-488	B-	Final Exam	1	150	150
471-479	C+				600
429-470	C				
420-428	C-				
360-419	D				
Below 360	F				

Students are encouraged to contact the instructor ahead of class in the event of an absence. When possible, late work will be accepted up to one week late with some deduction. (Additional info will be added by the instructor for the class.)

Anticipated schedule:

Date	Topic	Readings	Quizzes
Week 1	History of Barley, Malting, and Fermentation.	Mallett Chp 1, 2, 3 White Part 1 Selections	
Week 2	General Overview of the "hot-side" stages of Brewing (malting, milling, mashing, lautering/extraction, boiling/sterilization) and the general classes of reactions that occur therein.	Ockert Selections from Chps 2, 6	
Week 3	General Overview of the "cold-side" stages of Brewing (HOPS addition during/after boiling and fermentation) and the general classes of reactions that occur therein.	Ockert Selections from Chps 4, 6	Quiz 1
Week 4	From Barley to Malt: Steeping, Germination, Kilning, & Roasting.	Mallett Chp 4 Ockert Chp 2	
Week 5	More on Malt Chemistry: Enzymatic conversions, Browning, caramelization, and Maillard reactions.	Mallett Chp 6	
Week 6	Monitoring and troubleshooting "hot-side" processes	Mallett Chp 10	Quiz 2

Week 7	Tweaking the Malt: Specialty Malts	Selections from Mallett Chps 5, 7, Ockert Selections from Chp 3	
Week 8	Milling & Mashing	Ockert Chp 6 Selections Mallett Chp 12	
Week 9	Lautering/Extracting, Boiling/Sterilizing,	Ockert Chp 6 Selections	
Week 10	Mid-Term Exam and discussion of Projects		
Week 11	Hops & adjuncts additions, oils, aromas, and isomerizations	Ockert Chp 4 Hieronymous Chp 1	
Week 12	Hops & adjuncts additions continued	Hieronymous Chps 7, 9 Selections	
Week 13	Intro to the Chemistry and Biology of Fermentation	White Part 1,2, 3, 4 Selections	Quiz 3
Week 14-15	Presentations & Review		

Academic Honesty:

Students will be expected to adhere to standards of academic honesty and integrity, as outlined in the Student Academic Honesty Policy. All written work and oral presentation assignments must be original work. All ideas/material that are borrowed from other sources must have appropriate references to the original sources. Any quoted material should give credit to the source and be punctuated with quotation marks.

Students are responsible for honest completion of their work including examinations. There will be no tolerance for infractions. If you believe there has been an infraction by someone in the class, please bring it to the instructor's attention. The instructor reserves the right to discipline any student for academic dishonesty, in accordance with the general rules and regulations of the university. Disciplinary action may include the lowering of grades and/or the assignment of a failing grade for an exam, assignment, or the class as a whole."

ADA Statement:

Students with disabilities who require reasonable accommodations must be approved for services by providing appropriate and recent documentation to the Office of Disabled Student Services (DSS). This office is located in Craven Hall 5205, and can be contacted by phone at (760) 750-4905, or TTY (760) 750-4909. Students authorized by DSS to receive reasonable accommodations are encouraged to meet with me outside of class, e.g. during my office hours in order to ensure confidentiality.