

## 1. General Information

1a. Submitted by the College of: AGRICULTURE, FOOD AND ENVIRONMENT

Date Submitted: 5/18/2015

1b. Department/Division: Biosystems & Agr Engineering

1c. Contact Person

Name: Czarena Crofcheck

Email: crofcheck@uky.edu

Phone: 859 218-4349

Responsible Faculty ID (if different from Contact)

Name:

Email:

Phone:

1d. Requested Effective Date: Semester following approval

1e. Should this course be a UK Core Course? No

## 2. Designation and Description of Proposed Course

2a. Will this course also be offered through Distance Learning?: No

2b. Prefix and Number: AEN 341

2c. Full Title: Brewing Science and Technology

2d. Transcript Title:

2e. Cross-listing:

2f. Meeting Patterns

LECTURE: 3

2g. Grading System: Letter (A, B, C, etc.)

2h. Number of credit hours: 3

2i. Is this course repeatable for additional credit? No

If Yes: Maximum number of credit hours:

If Yes: Will this course allow multiple registrations during the same semester?

2j. Course Description for Bulletin: Introduction to the science and technology associated with the brewing of beer.

Topics will include the history of beer, varieties of beer, and production of beer. Within the discussions about the production of beer, the effect of raw materials, processing, microbiology, and storage on the taste and appearance of the beer will be studied. The class will also cover beer appreciation and sensory perception, which will complement the discussions of science and technology in the production of beer.

2k. Prerequisites, if any: All students must be 21 by the first day of class.

2l. Supplementary Teaching Component:

3. Will this course taught off campus? No

If YES, enter the off campus address:

4. Frequency of Course Offering: Fall,

Will the course be offered every year?: Yes

If No, explain:

5. Are facilities and personnel necessary for the proposed new course available?: Yes

If No, explain:

6. What enrollment (per section per semester) may reasonably be expected?: 60

7. Anticipated Student Demand

Will this course serve students primarily within the degree program?: No

Will it be of interest to a significant number of students outside the degree pgm?: Yes

If Yes, explain: This course will be applicable for the Undergraduate Certificate in Distillation, Wine and Brewing Studies, which is currently being proposed.

8. Check the category most applicable to this course: Not Yet Found in Many (or Any) Other Universities ,

If No, explain:

9. Course Relationship to Program(s).

a. Is this course part of a proposed new program?: Yes

If YES, name the proposed new program: This course will be an optional selection for the Undergraduate Certificate in Distillation, Wine and Brewing Studies.

b. Will this course be a new requirement for ANY program?: No

If YES, list affected programs:

10. Information to be Placed on Syllabus.

a. Is the course 400G or 500?: No

b. The syllabus, including course description, student learning outcomes, and grading policies (and 400G-/500-level grading differentiation if applicable, from 10.a above) are attached: Yes

## Distance Learning Form

Instructor Name:

Instructor Email:

Internet/Web-based: No

Interactive Video: No

Hybrid: No

1. How does this course provide for timely and appropriate interaction between students and faculty and among students? Does the course syllabus conform to University Senate Syllabus Guidelines, specifically the Distance Learning Considerations?

2. How do you ensure that the experience for a DL student is comparable to that of a classroom-based student's experience? Aspects to explore: textbooks, course goals, assessment of student learning outcomes, etc.

3. How is the integrity of student work ensured? Please speak to aspects such as password-protected course portals, proctors for exams at interactive video sites; academic offense policy; etc.

4. Will offering this course via DL result in at least 25% or at least 50% (based on total credit hours required for completion) of a degree program being offered via any form of DL, as defined above?

If yes, which percentage, and which program(s)?

5. How are students taking the course via DL assured of equivalent access to student services, similar to that of a student taking the class in a traditional classroom setting?

6. How do course requirements ensure that students make appropriate use of learning resources?

7. Please explain specifically how access is provided to laboratories, facilities, and equipment appropriate to the course or program.

8. How are students informed of procedures for resolving technical complaints? Does the syllabus list the entities available to offer technical help with the delivery and/or receipt of the course, such as the Information Technology Customer Service Center (<http://www.uky.edu/UKIT/>)?

9. Will the course be delivered via services available through the Distance Learning Program (DLP) and the Academic Technology Group (ATL)? NO

If no, explain how student enrolled in DL courses are able to use the technology employed, as well as how students will be provided with assistance in using said technology.

10. Does the syllabus contain all the required components? NO

11. I, the instructor of record, have read and understood all of the university-level statements regarding DL.

Instructor Name:

SIGNATURE[SNOKES]Sue E Nokes|AEN 341 NEW Dept Review|20141014

SIGNATURE[SNOKES]Sue E Nokes|AEN 341 NEW Dept Review|20141114

SIGNATURE[LGRABAU]Larry J Grabau|AEN 341 NEW College Review|20150505

SIGNATURE|LGRABAU|Larry J Grabau|AEN 341 NEW College Review|20150120

SIGNATURE|JMETT2|Joanie Ett-Mims|AEN 341 NEW Undergrad Council Review|20150408

SIGNATURE|JEL224|Janie S Ellis|AEN 341 NEW Senate Council Review|20150518

SIGNATURE|SNOKES|Sue E Nokes|AEN 341 NEW Approval Returned to Dept|20150519

## New Course Form

<https://myuk.uky.edu/sap/bc/soap/rfc?services=>

Open in full window to print or save

Generate R

Attachments:

Upload File

	ID	Attachment
Delete	4691	AEN-341 EtOH Letter to Nokes.docx
Delete	4825	Approval from Legal.pdf
Delete	4829	AEN-341 Brewing Science and Technology 2015 04 02.

(\*denotes required fields)

1. General Information

- a. \* Submitted by the College of:  Submission Date:
- b. \* Department/Division:
- c.
- \* Contact Person Name:  Email:  Phone:
- \* Responsible Faculty ID (if different from Contact):  Email:  Phone:
- d. \* Requested Effective Date:  Semester following approval OR  Specific Term/Year
- e. Should this course be a UK Core Course?  Yes  No
- If YES, check the areas that apply:
- Inquiry - Arts & Creativity  Composition & Communications - II
- Inquiry - Humanities  Quantitative Foundations
- Inquiry - Nat/Math/Phys Sci  Statistical Inferential Reasoning
- Inquiry - Social Sciences  U.S. Citizenship, Community, Diversity
- Composition & Communications - I  Global Dynamics

2. Designation and Description of Proposed Course.

- a. \* Will this course also be offered through Distance Learning?  Yes  No
- b. \* Prefix and Number:
- c. \* Full Title:
- d. Transcript Title (if full title is more than 40 characters):
- e. To be Cross-Listed <sup>2</sup> with (Prefix and Number):
- f. \* Courses must be described by at least one of the meeting patterns below. Include number of actual contact hours<sup>3</sup> for each meeting pattern type.
- |   |  |                                     |                                     |
|---|--|-------------------------------------|-------------------------------------|
| <input checked="" type="checkbox"/> 3 Lecture | <input type="checkbox"/> Laboratory <sup>1</sup> | <input type="checkbox"/> Recitation | <input type="checkbox"/> Discussion |
| <input type="checkbox"/> Indep. Study         | <input type="checkbox"/> Clinical                | <input type="checkbox"/> Colloquium | <input type="checkbox"/> Practicum  |
| <input type="checkbox"/> Research             | <input type="checkbox"/> Residency               | <input type="checkbox"/> Seminar    | <input type="checkbox"/> Studio     |
| <input type="checkbox"/> Other                | If Other, Please explain: <input type="text"/>   |                                     |                                     |
- g. \* Identify a grading system:
- Letter (A, B, C, etc.)
- Pass/Fail
- Medicine Numeric Grade (Non-medical students will receive a letter grade)
- Graduate School Grade Scale
- h. \* Number of credits:
- i. \* Is this course repeatable for additional credit?  Yes  No
- If YES: Maximum number of credit hours:
- If YES: Will this course allow multiple registrations during the same semester?  Yes  No

J. \* Course Description for Bulletin:

Introduction to the science and technology associated with the brewing of beer. Topics will include the history of beer, varieties of beer, and production of beer. Within the discussions about the production of beer, the effect of raw materials, processing, microbiology, and storage on the taste and appearance of the beer will be studied. The class will also cover beer appreciation and sensory perception, which will complement the discussions of science and technology in the production of beer.

K. Prerequisites, if any:

All students must be 21 by the first day of class.

I. Supplementary teaching component, if any:  Community-Based Experience  Service Learning  Both

3. \* Will this course be taught off campus?  Yes  No

If YES, enter the off campus address:

4. Frequency of Course Offering.

a. \* Course will be offered (check all that apply):  Fall  Spring  Summer  Winter

b. \* Will the course be offered every year?  Yes  No

If No, explain:

5. \* Are facilities and personnel necessary for the proposed new course available?  Yes  No

If No, explain:

6. \* What enrollment (per section per semester) may reasonably be expected? 60

7. Anticipated Student Demand.

a. \* Will this course serve students primarily within the degree program?  Yes  No

b. \* Will it be of interest to a significant number of students outside the degree pgm?  Yes  No

If YES, explain:

This course will be applicable for the Undergraduate Certificate in Distillation, Wine and Brewing Studies, which is currently being proposed.

8. \* Check the category most applicable to this course:

Traditional – Offered in Corresponding Departments at Universities Elsewhere

Relatively New – Now Being Widely Established

Not Yet Found in Many (or Any) Other Universities

9. Course Relationship to Program(s).

a. \* Is this course part of a proposed new program?  Yes  No

If YES, name the proposed new program:

This course will be an optional selection for the Undergraduate Certificate in Distillation, Wine and Brewing Studies.

b. \* Will this course be a new requirement <sup>5</sup> for ANY program?  Yes  No

If YES <sup>5</sup>, list affected programs:

10. Information to be Placed on Syllabus.

a. \* Is the course 400G or 500?  Yes  No

If YES, the *differentiation for undergraduate and graduate students must be included* in the information required in 10.b. You must include: (i) ident additional assignments by the graduate students; and/or (ii) establishment of different grading criteria in the course for graduate students. (See SR

b.  \* The syllabus, including course description, student learning outcomes, and grading policies (and 400G-/500-level grading differentiation if appl 10.a above) are attached.

<sup>11</sup> Courses are typically made effective for the semester following approval. No course will be made effective until all approvals are received.  
<sup>12</sup> The chair of the cross-listing department must sign off on the Signature Routing Log

In general, undergraduate courses are developed on the principle that one semester hour of credit represents one hour of classroom meeting per week for a semester, exclusive of any laboratory meeting. Laboratory meeting, generally, requires two hours per week for a semester for one credit hour. (from SR 5.2.1)

You must also submit the Distance Learning Form in order for the proposed course to be considered for DL delivery.

In order to change a program, a program change form must also be submitted.

Rev 8/09

I am aware that a wine appreciation class is already taught in CAFE and I hope that the college will think of this class an appropriate compliment to Dr. Barrett's class. I just wanted to make sure you were aware of my plans to include beer tasting as a part of the class and to make sure that I get all of the necessary approvals. I would really appreciate your approval of my plans and any feedback you might have about others that should be consulted.

Thank you in advance for helping me with this and if you have any questions, please let me know.

Sincerely,

Czarena Crofcheck, Ph.D., P. E.

Associate Professor, Biosystems & Agricultural Engineering





Dear Dr. Nokes,

I am working with the group that is proposing certificate program "Distillation, Wine and Brewing Studies", recently been approved by the CAFE UCC. I am planning to develop and teach a course entitled AEN 341 Beer Science and Technology to provide necessary brewing studies electives for the certificate.

My hope it to teach it to a limited number of students (only with consent of instructor and over 21) as a GEN 300 in Spring 2014, possibly teaching the official course in Fall 2014.

**Course Description:**

Introduction to the science and technology associated with the brewing of beer. Topics will include the history of beer, varieties of beer, and production of beer. Within the discussions about the production of beer, the effect of raw materials, processing, microbiology, and storage on the taste and appearance of the beer will be studied. The class will also cover beer appreciation and sensory perception, which will complement the discussions of science and technology in the production of beer.

I am planning to include in the class a series of five lectures on beer tasting. This course will be limited to students 21 or older and proof of age will be required. I'm planning to have the five beer tasting lectures in the Good Barn, one of the approved buildings for alcohol according to University Alcohol Policy (AR 6:4).

**From the syllabus**

**Beer Tasting:** Lectures 20-24 will focus on beer appreciation and include beer tasting (not necessarily consumption). All students must be 21 by the **first** day of class. This portion of the class is intended as an educational experience, to increase the students' knowledge of beer and the differences in tastes due to processing changes. The beer samples are for tasting purposes only and will be limited to a total of no more than one standard serving of beverage alcohol. Students are not required to swallow samples, but can swirl, taste, and spit in to the cups provided for this purpose. If there is a student that would prefer not to taste the beer samples at all, an alternative assignment will be provided.

While I hope to have much of the beer used for the class donated or supplied at wholesale cost, I do plan to propose a course fee for the cost of the beer and possible field trips. My current thought is the fee would be \$25 (for only 5 lectures of tasting).

## Ett, Joanie M

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**From:** Crofcheck, Czarena L  
**Sent:** Tuesday, April 07, 2015 5:24 PM  
**To:** Badger, Karen; DeBolt, Seth; Ett, Joanie M  
**Subject:** AEN 341 Brewing Science and Technology

Here is the approval from UK Legal.

Thanks!!!!

Sent from my iPhone

Begin forwarded message:

**From:** "Williamson, T. Lynn" <[T.Lynn.Williamson@uky.edu](mailto:T.Lynn.Williamson@uky.edu)>  
**Date:** April 7, 2015 at 4:46:33 PM EDT  
**To:** "Crofcheck, Czarena L" <[crofcheck@uky.edu](mailto:crofcheck@uky.edu)>  
**Cc:** "West, Timothy A" <[timothy.west@uky.edu](mailto:timothy.west@uky.edu)>  
**Subject:** RE: GEN 300 Brewing Science and Technology

Sorry, I was out of office Friday and yesterday. This has approval of Legal office. We see no issues/concerns with this course and its description. We believe this is being responsive to the liquor industry, a major industry in Kentucky and to the UK students who will be employed in this major industry.

T. Lynn

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**From:** Crofcheck, Czarena L  
**Sent:** Monday, April 06, 2015 8:25 AM  
**To:** Crofcheck, Czarena L  
**Cc:** Williamson, T. Lynn  
**Subject:** Re: GEN 300 Brewing Science and Technology

Just checking to see when I might be able to get my all clear from UK legal. The UGC is running behind and is asking me to get the documentation to them ASAP.

Sent from my iPhone

On Apr 2, 2015, at 4:02 PM, Crofcheck, Czarena L <[crofcheck@uky.edu](mailto:crofcheck@uky.edu)> wrote:

Yes!

There are these tasting kits where you can buy the "off-flavors", so there might be a tasting where we would taste 6 samples (2 oz) in one tasting... I haven't tried it yet but even more with smaller volume might be possible. These will likely taste awful, so no reason to drink more than a sip. Not to mention they could be expensive.

<image001.png>

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**From:** Williamson, T. Lynn  
**Sent:** Thursday, April 02, 2015 3:54 PM  
**To:** Crofcheck, Czarena L; West, Timothy A  
**Subject:** RE: GEN 300 Brewing Science and Technology

The clarification was for our purposes. I would go back to the original language. I don't think we want to create an expectation of students that they will be getting 12 oz of beer each class or for the public to know exactly what the amounts will be.

Again for clarification, a sample might be 2 oz and thus a student could receive no more than 6 samples per class?

Or is a sample 12 oz and there will be only one sample per class.

Or might a sample be one oz and a student could receive 12 samples per class.

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**From:** Crofcheck, Czarena L  
**Sent:** Thursday, April 02, 2015 3:41 PM  
**To:** West, Timothy A  
**Cc:** Williamson, T. Lynn  
**Subject:** RE: GEN 300 Brewing Science and Technology

I added the highlighted sentence:

**Beer Appreciation Note:** Lectures 20-24 will focus on beer appreciation and include beer tasting (not necessarily consumption). All students must be 21 by the **first day** of class. This portion of the class is intended as an educational experience, to increase the students' knowledge of beer and the differences in tastes due to processing changes. The beer samples are for tasting purposes only and will be limited to a total of no more than one standard serving of beverage alcohol. **A standard serving of beer is 12 oz, so no more than 12 oz of beer may be consumed in a single lecture period (65 minutes).** Students are not required to swallow samples, but can swirl, taste, and spit in to the cups provided for this purpose. If there is a student that would prefer not to taste the beer samples at all, an alternative assignment will be provided. The course charge for this course will cover the tasting. All tasting selections are determined by the instructor.

Does that work?

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**From:** West, Timothy A  
**Sent:** Thursday, April 02, 2015 3:38 PM  
**To:** Crofcheck, Czarena L  
**Cc:** Williamson, T. Lynn  
**Subject:** RE: GEN 300 Brewing Science and Technology

Thank you. We wanted to confirm that that "one standard serving" was an aggregate of all the samples, as opposed to each sample being one standard serving.

You might specifically define "standard serving" as being 12 ounces and clarify that nobody will consume more than that amount during any one class.

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**From:** Crofcheck, Czarena L  
**Sent:** Thursday, April 02, 2015 3:34 PM  
**To:** West, Timothy A  
**Cc:** Williamson, T. Lynn  
**Subject:** RE: GEN 300 Brewing Science and Technology

Of course!

Here is the disclaimer from the syllabus:

**Beer Appreciation Note:** Lectures 20-24 will focus on beer appreciation and include beer tasting (not necessarily consumption). All students must be 21 by the **first** day of class. This portion of the class is intended as an educational experience, to increase the students' knowledge of beer and the differences in tastes due to processing changes. The beer samples are for tasting purposes only and will be limited to a total of no more than one standard serving of beverage alcohol. Students are not required to swallow samples, but can swirl, taste, and spit in to the cups provided for this purpose. If there is a student that would prefer not to taste the beer samples at all, an alternative assignment will be provided. The course charge for this course will cover the tasting. All tasting selections are determined by the instructor.

If you would like me to expand that, I can do so.

A standard serving of beer is 12 oz, so 4 tastes of 3 oz each OR 3 tastes of 4 oz each and so on.

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**From:** West, Timothy A  
**Sent:** Thursday, April 02, 2015 3:30 PM  
**To:** Crofcheck, Czarena L  
**Cc:** Williamson, T. Lynn  
**Subject:** RE: GEN 300 Brewing Science and Technology

Dr. Crofcheck,

Assuming the students choose not to spit out the tasting samples, how much beer could they consume during class? Specifically, what is the sample size and how many samples will be consumed in any given class? Obviously, we don't want a situation where anyone could leave the class intoxicated so it's important that we closely manage the amount consumed during tastings.

Tim.

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**From:** Crofcheck, Czarena L  
**Sent:** Thursday, April 02, 2015 1:53 PM  
**To:** West, Timothy A; Cox, Nancy  
**Subject:** RE: GEN 300 Brewing Science and Technology

Greetings Tim & Nancy,

My AEN 341 Brewing Science and Technology class is currently being reviewed by the undergraduate council. They have requested that I obtain a letter from UK legal. Here is the actual request:

- 2) Because of the alcohol consumption component of the course, we are asking that the course (its requirements and policies) be reviewed with UK Legal and either approved or a statement received from legal that states there are no concerns from their standpoint with the class.

Since we had already reviewed basically the same syllabus for GEN 300, I thought I would start with CAFE legal and see where I should go from here to satisfy the senate council.

Thank you in advance!  
Czar

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**From:** West, Timothy A  
**Sent:** Friday, November 07, 2014 1:18 PM  
**To:** Cox, Nancy  
**Cc:** Crofcheck, Czarena L  
**Subject:** RE: GEN 300 Brewing Science and Technology

At first blush, it all looks good. I'll take a closer look this afternoon.

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**From:** Cox, Nancy  
**Sent:** Thursday, November 06, 2014 1:48 PM  
**To:** West, Timothy A  
**Cc:** Crofcheck, Czarena L  
**Subject:** FW: GEN 300 Brewing Science and Technology

Tim  
By copy of this email, I approve of Dr. Crofcheck's course and commend her for her creativity. I would like for you to be aware of this approval and review the plans for the class.

Thanks  
Nancy

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**From:** Crofcheck, Czarena L  
**Sent:** Tuesday, November 04, 2014 2:52 PM  
**To:** Cox, Nancy  
**Cc:** Grabau, Larry; Nokes, Sue; DeBolt, Seth  
**Subject:** GEN 300 Brewing Science and Technology

Greetings Nancy,

I'm teaching a GEN 300 class this spring on Brewing Science and Technology. My goal is to develop a class that will be a significant addition to the Wine, Beer, and Distilling certificate (minor, program, etc). I believe that it will be important to give the students the educational experience that would require beer tasting to fully develop the potential of this class. Please find attached a letter explaining my plans that also asks for your approval. I have also attached the syllabus of the GEN 300 class. My plan is to have only 15 in this first class.

Please let me know if you have any questions, concerns, etc.

Thank you in advance!!

Cheers,  
Czar

\*\*\*\*\*

Czarena Crofcheck, PhD, PE  
Associate Professor and  
Director of Undergraduate Studies  
Biosystems & Agricultural Engineering  
University of Kentucky  
213 CE Barnhart Building  
Lexington, KY 40546  
Voice: (859) 218-4349  
Fax: (859) 257-5671  
Email: [crofcheck@uky.edu](mailto:crofcheck@uky.edu)

ALSO Past President of IBE  
<http://www.ibe.org/>

ALSO Co-Chair of the  
Kentucky Girls STEM Collaborative  
<http://www.kygirlsstem.org/>

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**Schedule of Lectures:**

Dates	Topics	Case Study
January		
15	What is beer, market value, etc.	
20	Types of Beer;	
22	Brewing steps;	
27	History of beer	
29	Barley, Malt	CS#1 due Jan 29
February		
3	Hops	
5	Effects of beer on the human body	CS#2 due Feb 5
10	Exam Review	
12	<b>Exam 1</b>	
17,	fermenters	
19	separators	CS#3 due Feb 19
24	clarification	
26	sanitation	
March		
3	bottling	
5	grains	CS#4 due March 5
10	yeast	
12	water & CO <sub>2</sub>	
24	Exam Review	CS#5 due April 24
26	<b>Exam 2</b>	
April		
2-16	Sensory perception of beer, beer varieties, food pairings	
21-30	Guest Brewers: Distribution, marketing, etc	CS#6 due April 21
May-4-6	<b>Final Exam</b>	

Part II of Student Rights and Responsibilities (available online <http://www.uky.edu/StudentAffairs/Code/part2.html>) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about the question of plagiarism involving their own work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording or anything else from another source without appropriate acknowledgement of the fact, the students are guilty of plagiarism. Plagiarism includes reproducing someone else's work, whether it be a published article, chapter of a book, a paper from a friend or some file, or something similar to this. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work which a student submits as his/her own, whoever that other person may be.

Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone. When a student's assignment involves research in outside sources of information, the student must carefully acknowledge exactly what, where and how he/she employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas which are so generally and freely circulated as to be a part of the public domain (Section 6.3.1).

Please note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.

**Accommodations due to disability:**

If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754, email address: [jkarnes@email.uky.edu](mailto:jkarnes@email.uky.edu)) for coordination of campus disability services available to students with disabilities.



## ATTENDANCE

### **AEN 341 Attendance Policy:**

Class attendance is required. A student must arrive within 5 minutes of the scheduled start of class and must stay for the remainder of the period to be credited for attendance. Your grade will be reduced by 5% for each week-equivalent of class missed beyond one week. For example, since AEN 341 meets two times per week, the following grade reductions would be incurred:

Number of Unexcused Absences	Grade Reduction
1-2	0%
3-4	5%
5-6	10%

And so forth...

Excused absences, as defined in the University Bulletin, are not counted in this total.

### **Excused Absences:**

Students need to notify the professor of absences prior to class when possible. S.R. 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, and (e) other circumstances found to fit "reasonable cause for nonattendance" by the professor.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Information regarding dates of major religious holidays may be obtained through the religious liaison, Mr. Jake Karnes (859-257-2754).

Students are expected to withdraw from the class if more than 20% of the classes scheduled (for meeting twice a week this would be more than 6 classes) for the semester are missed (excused or unexcused) per university policy.

### **Verification of Absences:**

Students may be asked to verify their absences in order for them to be considered excused. Senate Rule 5.2.4.2 states that faculty have the right to request "appropriate verification" when students claim an excused absence because of illness or death in the family. Appropriate notification of absences due to university-related trips is required prior to the absence.

### **Academic Integrity:**

Per university policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the university may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: <http://www.uky.edu/Ombud>. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

in depth resulting in a 1-3 page essay with a format and example provided in class. Case Studies 1-5 are submitted during class in paper form (they should be typed). For case study 6, students will build a tasting flight (typed on paper), which will need to include details about the significance of their choices.

**General Schedule of Lectures:**

Lecture	Topic	Case Study
1	<b>Introduction:</b> What is beer, market value, etc.	
2-4	<b>Basics:</b> Types of Beer; Brewing steps; History of beer	<b>1</b>
5-6	<b>Beer Chemistry:</b> Barley, Malt and Hops, oh my!	<b>2</b>
7-8	<b>Beer Biology:</b> effects of beer on the human body	<b>3</b>
9	Midterm Exam 1	
10-12	<b>Beer Unit Operations:</b> fermenters, separators, clarification, sanitation, bottling	<b>4</b>
16-18	<b>Raw Materials:</b> grains, yeast, water & CO <sub>2</sub>	<b>5</b>
19	Midterm Exam 2	
20-24	<b>Beer Appreciation:</b> Sensory perception of beer, beer varieties, food pairings	<b>6</b>
25-30	<b>Guest Brewers:</b> Distribution, marketing, etc.	

**Beer Appreciation Note:** Lectures 20-24 will focus on beer appreciation and include beer tasting (not necessarily consumption). All students must be 21 by the **first** day of class. This portion of the class is intended as an educational experience, to increase the students' knowledge of beer and the differences in tastes due to processing changes. The beer samples are for tasting purposes only and will be limited to a total of no more than one standard serving of beverage alcohol. A standard serving of beer is 12 oz, so no more than 12 oz of beer may be consumed in a single lecture period (65 minutes). Students are not required to swallow samples, but can swirl, taste, and spit in to the cups provided for this purpose. If there is a student that would prefer not to taste the beer samples at all, an alternative assignment will be provided. The course charge for this course will cover the tasting. All tasting selections are determined by the instructor.

**Classroom conduct:** Cell phones should be silent (no talking or texting) during class. I typically distribute handouts at the beginning of class. If you are late to class, please come to the front of the class and pick up handouts, if you miss a day it is your responsibility to get a copy of the handout.

**Cheating and Plagiarism:** Please be sure that you only turn in work that is your own, whether it is homework, a case study, or exam. If you're unsure about what constitutes cheating, please see me. More information is provided below as to how this topic is generally thought about in terms of academic integrity.

**Mid-term Grades:** Mid-term grades will be posted in myUK by the deadline established in the Academic Calendar (<http://www.uky.edu/Registrar/AcademicCalendar.htm>).

**Final Exam:** The final exam will be given during finals week at the time determined by the UK finals exam schedule in the regular meeting room (<http://www.uky.edu/registrar/calendar>).

## **AEN 341/TSM 341 Brewing Science and Technology (3 credits)**

Department of Biosystems and Agricultural Engineering  
College of Agriculture, Food and Environment

**Instructor:** Dr. Czarena Crofcheck, Rm 213 CE Barnhart Building, (859) 218-4349, the best way to reach me is by email: crofcheck@uky.edu

**Office Hours:** By appointment or whenever my door is open.

**Class Times:** 2 lectures of 1:15 minutes each

**Location:** CEBA 228

### **Course Description:**

Introduction to the science and technology associated with the brewing of beer. Topics will include the history of beer, varieties of beer, and production of beer. Within the discussions about the production of beer, the effect of raw materials, processing, microbiology, and storage on the taste and appearance of the beer will be studied. The class will also cover beer appreciation and sensory perception, which will complement the discussions of science and technology in the production of beer.

**Pre-req:** Must be 21 years of age prior to first day of class.

**Beer Appreciation Note:** Students are not required to swallow samples, but can swirl, taste, and spit in to the cups provided for this purpose. If there is a student that would prefer not to taste the beer samples at all, an alternative assignment will be provided.

### **Required Text:**

“Designing Great Beers: The Ultimate Guide to Brewing Classic Beer Styles” by Ray Daniels, Brewers Publications, 1998.

“Beer: Tap into the Art and Science of Brewing” by Charles Bamforth, Oxford University Press, 2009.

### **Student Learning Outcomes:**

When you finish this course you should be able to:

- Explain the brewing process and the unit operations necessary for brewing beer.
- Demonstrate the importance of particular qualities for raw materials, such as barley, hops, and water.
- Explain the distribution and product logistics chain that is critical to economic viability.
- Differentiate the nature of bitter and aroma hops, their uses in brewing and their contributions to beer flavor and foam.
- Classify yeasts that are available for brewing different beer styles.
- Classify several beer styles based on bases malting, mashing, and hops.
- Assess the sensory properties of beer (flavor, color, foam, and haze) and outline how these are influenced by brewing raw materials and processing.
- Distinguish the differences in flavor defects (tastes and colors) and the processes that produce them.

**Grading:** Final grades will be assigned as follows: > 89.5 A, 79.5 – 89.4 B, 69.5 – 79.4 C, 59.5 – 69.4 D, E < 59.4. Final grades will be based on the following distribution: Quizzes (7) 20%, Midterms (2) 30%; Final Exam 20%, Case Studies (6) 30%

Quizzes will be given every other week, to assess the achievement of the student learning outcomes. There will be two midterm exams and a final exam. There will be six case studies, where each case study will focus on a different topic (see topic list below). For case studies 1-5, students will be required to identify (with help from the instructor) a sub-topic related to the class topic (but not discussed in class) to be summarized and analyzed more