

**MEMORANDUM TO:** Ogden College of Science and Engineering Curriculum Committee

Dr. Linda Brown	Dr. James Gary	Dr. Mike Carini
Dr. Martin Stone	Dr. Huanjing Wang	Dr. Doug Harper
Dr. Greg Arbuckle	Dr. Julie Ellis	Dr. Kelly Madole
Dr. Mark Revels	Dr. Warren Campbell	Dr. Steve Haggbloom
Dr. Bruce Schulte	Dr. David Keeling	Dr. Les Pesterfield
Dr. Phil Lienesch	Dr. Xingang Fan	
Dr. Stuart Burris	Dr. Bruce Kessler	
Dr. Darwin Dahl	Dr. Ngoc Nguyen	

**FROM:** Kenneth Crawford, Chair

**SUBJECT:** Agenda for Thursday, October 8, 4:00 p.m. in COHH 4123

**A. OLD BUSINESS:**

- I. Consideration of the minutes of the September 3, 2015 meeting.

**B. NEW BUSINESS:**

**Information Items**

**Department of Biology**

- I. Proposal to Create a Temporary Course
  - a. BIOL 285, Introduction to Field Biology, 1-4 hrs.

**Ogden College Dean's Office**

- I. Proposal to Revise Course Prefix
  - a. BDA to BDAS: BDA 310, BDA 310-M1, BDA 310-M2

**Consent Items**

**Department of Engineering**

- I. Proposal to Revise Course Prerequisites/Corequisites
  - a. CE 400, Civil Engineering Senior Design Seminar, 1 hrs.

**Action Items**

**Department of Engineering**

- I. Proposal to Revise a Program
  - a. Ref. 534, Civil Engineering, 131 hrs.

**Ogden College Dean's Office**

- I. Proposal to Create a New Course
  - a. BDAS 300, The Science of Fermentation in Brewing and Distilling, 3 hrs.
  - b. BDAS 495, Brewing /Distilling Internship, 1-3 hrs.

- II. Proposal to Create a New Certificate Program
  - a. Brewing and Distilling Arts & Sciences, 12-15 hrs.

**C. OTHER BUSINESS**

**Ogden College Dean's Office**

- I. Curriculum Committee, OCSE, Standing Rules

**MEMBERS PRESENT:**

Dr. Linda Brown  
Dr. Greg Arbuckle  
Dr. Mark Revels  
Dr. Bruce Schulte  
Dr. Phil Lienesch  
Dr. Stuart Burris  
Dr. James Gary  
Dr. Kelly Madole  
Dr. Steve Haggbloom by proxy  
Dr. Les Pesterfield

Dr. Julie Ellis  
Dr. Warren Campbell  
Dr. David Keeling by proxy  
Dr. Xingang Fan  
Dr. Bruce Kessler  
Dr. Ngoc Nguyen  
Dr. Mike Carini  
Dr. Doug Harper by proxy  
Dr. Jeremy Maddox for. Dr. Darwin Dahl

**FROM:** Ken Crawford, Chair

**OLD BUSINESS:**

Kessler/Campbell moved for approval of the minutes of the September 3, 2015 meeting. Motion approved.

**NEW BUSINESS:**

**Consent Agenda**

Arbuckle/Kessler moved to approved consent items. Motion approved.

**Action Agenda**

**Department of Engineering**

Arbuckle/Kessler moved to approve proposal to revise a program, Ref. 476, Systems Engineering. Motion approved.

**OTHER BUSINESS:**

Draft of revisions to the OCSE Standing Rules were reviewed and discussed. The revisions will be revisited at the next OCSE Curriculum Committee meeting.

Meeting adjourned at 4:37pm.

Proposal Date: 25 September 2015

**Ogden College of Science and Engineering**  
**Department of Biology**  
**Proposal to Create a Temporary Course**  
**(Information Item for First Offering)**

Contact Person: Scott Grubbs, scott.grubbs@wku.edu, 745-5048

**1. Identification of proposed course:**

- 1.1 Course prefix (subject area) and number: BIOL 285
- 1.2 Course title: Introduction to Field Biology
- 1.3 Abbreviated course title: Introduction to Field Biology  
(maximum of 30 characters or spaces)
- 1.4 Credit hours: 1–4
- 1.5 Schedule type: C
- 1.6 Prerequisites/corequisites: None
- 1.7 Grade type: X standard letter grade \_\_\_ pass/fail \_\_\_ in progress (IP)
- 1.8 Course description: An introductory field experience on a specific biological or ecological topic.

**2. Rationale**

- 2.1 Reason for offering this course on a temporary basis: The Department of Biology offers Field Biology (BIOL 485) on a regular basis, yet this is occasionally inappropriate when the evaluatory assessment measures are more aligned with a lower-division course. Biology offers a field course each January for Gatton Academy students in Costa Rica under the BIOL 485 heading that would be more appropriately placed under a lower-division course. Because there is insufficient time to have a new course available prior to winter term registration, Biology is proposing this course on a one-time temporary basis. A new course proposal is currently being drafted for adoption prior to the start of the next academic year.
- 2.2 Relationship of the proposed course to courses offered in other academic units: Geology and Geography offers several courses directed at specific geologic and hydrologic topics. Both the proposed temporary course and BIOL 485 are unique since the emphasis is on biological and ecological topics and questions.

**3. Description of proposed course**

- 3.1 Course content outline
  - Introduction to regional biodiversity
  - Local biodiversity
  - Local field trips
  - Ecotourism and conservation challenges
  - Introduction to scientific process
  - Student papers and/or presentations
  - Final assessments
- 3.2 Tentative text(s): None



**4. Second offering of a temporary course (if applicable)**

4.1 Reason for offering this course a second time on a temporary basis: NA

4.2 Term course was first offered: NA

4.3 Enrollment in first offering: NA

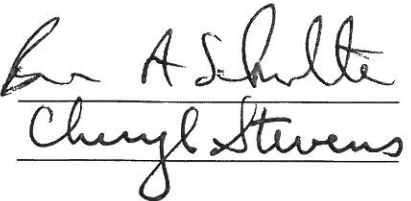
**5. Term of Implementation:** Winter 2016

**6. Dates of review/approvals:**

Department of Biology

Dean, Ogden College of Science and Engineering

Office of the Provost

  
\_\_\_\_\_  
Cheryl Stevens  
\_\_\_\_\_

Proposal date: 20 September, 2015

**Potter College of Arts & Letters  
Ogden College of Science and Engineering  
Proposal to Revise Course Prefix (Subject Area)  
(Information Item)**

Contact Person: Contact Person: Andrew McMichael [andrew.mcmichael@wku.edu](mailto:andrew.mcmichael@wku.edu) 745-6538  
Cathleen Webb [cathleen.webb@wku.edu](mailto:cathleen.webb@wku.edu) 745-4448

1. **Identification of current course prefix: BDA**
2. **Identification of proposed course prefix: BDAS**
3. **Rationale for the prefix revision:** The old prefix referred to a “Brewing and Distilling Academy.” The new prefix refers to “Brewing and Distilling Arts and Sciences,” which more accurately reflects the nature of the course and eventual program.
4. **Course numbers to be included under the new course prefix:** BDA 310, BDA 310-M1, BDA 310-M2
5. **Term of implementation:** Spring 2015
6. **Dates of notification to committees:**

Department/ Unit PCAL/OCSE Dean’s Offices  
Potter College Curriculum Committee  
Ogden College Curriculum Committee  
Undergraduate Curriculum Committee  
University Senate

20 Sept 2015

---

---

---

---

---

**Ogden College of Science and Engineering  
Department of Engineering  
Proposal to Revise Course Prerequisites/Corequisites  
(Consent Item)**

Contact Person: Shane M. Palmquist  
[Shane.Palmquist@wku.edu](mailto:Shane.Palmquist@wku.edu)  
270-745-2919

**1. Identification of course:**

- 1.1 Course prefix (subject area) and number: CE 400
- 1.2 Course title: Civil Engineering Senior Design Seminar

**2. Current prerequisites/corequisites/special requirements:**

PHYS 265 University Physics II and senior standing, or consent of instructor.

**3. Proposed prerequisites/corequisites/special requirements:**

Senior standing and consent of instructor.

**4. Rationale for the revision of prerequisites/corequisites/special requirements:**

The curriculum for the civil engineering program is changing. PHYS 265 will no longer be a required course. The program would like to change “or consent of instructor” to “and consent of instructor”. This will ensure that only seniors in civil engineering who are within one year of graduation may enroll in this course.

**5. Effect on completion of major/minor sequence:** None.

**6. Proposed term for implementation:** Fall 2016

**7. Dates of prior committee approvals:**

Department of Engineering

9/24/2015

Ogden College Curriculum Committee

Undergraduate Curriculum Committee

University Senate

**Ogden College of Science and Engineering  
Department of Engineering  
Proposal to Revise a Program  
(Action Item)**

Contact Person: Shane M. Palmquist  
[Shane.Palmquist@wku.edu](mailto:Shane.Palmquist@wku.edu)  
 270-745-2919

**1. Identification of program:**

- 1.1 Current program reference number: 534
- 1.2 Current program title: Engineering-Civil
- 1.3 Credit hours: Current: 131  
Proposed: 129

**2. Identification of the proposed program changes:**

- Delete STAT 301 Probability and Statistics (3 hrs.) as an option as shown in the program table in section 3 which will make CE 305 Risk Analysis (3 hrs.) a required course. Add STAT 301 to the list of options for the math or science elective.
- Add additional courses to the list of acceptable courses to be counted as technical electives. (See the third table in section 3 for the full list of approved technical elective courses.) A minimum of 6 of the 9 technical elective credit hours must come from CE prefixed courses.
- Replace PHYS 265/266 University Physics II and Lab (4/1 hrs.) with a math or science elective (3 hrs.) course. (See last table in section 3 for the approved list of courses.) A grade of “C” or better is required.
- One grade of “D” may be earned in a single 300-level or 400-level CE course.

**3. Detailed program description:**

**CE Current Program**

**CE Proposed Program**

Prefix	#	Course Title	Hrs.	Prefix	#	Course Title	Hrs.
CE	176	CE Fresh. Design,	1	CE	176	CE Freshman Design,	1
ME	176	ME Fresh Design, or		ME	176	ME Freshman Design, or	
EE	101	EE Design I		EE	101	EE Design I	
CE	160	Prin. of Surveying	3	CE	160	Prin. of Surveying	3
CE	161	Surveying Lab	1	CE	161	Surveying Lab	1
CE	303	Constr. Management	3	CE	303	Constr. Management	3

Prefix	#	Course Title	Hrs.	Prefix	#	Course Title	Hrs.
CE	304	Constr. Manag. Lab	1	CE	304	Constr. Management Lab	1
CE	305	Risk Analysis, or	3	CE	305	Risk Analysis, <del>or</del>	3
STAT	301	Prob. & Statistics		<del>STAT</del>	<del>301</del>	<del>Probability &amp; Statistics</del>	
CE	310	Strengths Lab	1	CE	310	Strengths Lab	1
CE	316	Equip. & Methods	3	CE	316	Equip. & Methods	3
CE	331	Transportation Eng.	3	CE	331	Transportation Eng.	3
CE	341	Fluid & Therm. Sc.	4	CE	341	Fluid & Thermal Science	4
	342				342		
CE	351	Intro. to Environ.	3	CE	351	Intro. to Environmental	3
	352	Engineering			352	Engineering	
CE	370	Materials of Constr,	2	CE	370	Materials of Construction	2
CE	371	Matls of Constr. Lab	1	CE	371	Matls. of Constr. Lab	1
CE	382	Structural Analysis	3	CE	382	Structural Analysis	3
	373				373		
CE	384	Civil Engineering	3	CE	384	Civil Engineering Design	3
	482	Design Course			482	Course	
	483				483		
CE	410	Soil Mechanics	3	CE	410	Soil Mechanics	3
CE	411	Soil Mechanics Lab	1	CE	411	Soil Mechanics Lab	1
CE	412	Foundation Eng.	3	CE	412	Foundation Eng.	3
CE	461	Hydrology	3	CE	461	Hydrology	3
CE	400	Senior Des. Seminar	1	CE	400	Senior Design Seminar	1
CE	498	Senior Project	3	CE	498	Senior Project	3
CE		Technical Elective*	3	CE		Technical Elective*	3
CE		Technical Elective*	3	CE		Technical Elective*	3
CE		Technical Elective*	3	CE		Technical Elective*	3
AMS	163	Arch. Drafting	3	AMS	163	Arch. Drafting	3
EM	221	Statics	3	EM	221	Statics	3
	222				222		
EM	302	Mechanics of	3	EM	302	Mechanics of Deformable	3
	303	Deformable Bodies			303	Bodies	
TOTALS		Credit Hours	67	TOTALS		Credit Hours	67

### Other Requirements

### Other Proposed Requirements

Prefix	#	Course Title	Hrs.	Prefix	#	Course Title	Hrs.
MATH	136	Calculus I	4	MATH	136	Calculus I	4
MATH	137	Calculus II	4	MATH	137	Calculus II	4
MATH	237	Multi. Calculus	4	MATH	237	Multivariable Calculus	4
MATH	331	Diff. Equations	3	MATH	331	Differential Equations	3
PHYS	255	University Physics I	4	PHYS	255	University Physics I	4
PHYS	256	Physics I Lab	1	PHYS	256	Physics I Lab	1
PHYS	265	University Physics II	4	<del>PHYS</del>	<del>265</del>	<del>University Physics II</del>	<del>4</del>
PHYS	266	Physics II Lab	1	<del>PHYS</del>	<del>266</del>	<del>Physics II Lab</del>	<del>1</del>

Prefix	#	Course Title	Hrs.	Prefix	#	Course Title	Hrs.
						<b>Science or Math Elective (See list below.)**</b>	<b>3</b>
CHEM	120	College Chemistry I	3	CHEM	120	College Chemistry I	3
CHEM	121	Chemistry I Lab	2	CHEM	121	Chemistry I Lab	2
GEOL	111	The Earth	3	GEOL	111	The Earth	3
GEOL	113	The Earth Lab	1	GEOL	113	The Earth Lab	1
<b>TOTALS</b>		<b>Credit Hours</b>	<b>34</b>	<b>TOTALS</b>		<b>Credit Hours</b>	<b>32</b>

\*Students are required to complete a total of 9 credit hours of technical electives in civil engineering or a related field. **A minimum of 6 credit hours must come from CE prefixed courses.**

### Current CE Technical Electives

### Proposed CE Technical Electives

Prefix	#	Course Title	Hrs.	Prefix	#	Course Title	Hrs.
CE	300	Floodplain Mgmt.	3	CE	300	Floodplain Management	3
CE	326	Engineering Law	3	CE	326	Engineering Law	3
CE	360	Est., Scheduling Bid.	3	CE	360	Est., Scheduling Bidding	3
CE	361	Estimating Lab	1	CE	361	Estimating Lab	1
CE	378	Boundary Surveying	3	CE	378	Boundary Surveying	3
CE	379	Boundary Surv. Lab	1	CE	379	Boundary Surveying. Lab	1
CE	380	Route Surveying	3	CE	380	Route Surveying	3
CE	381	Route Surveying Lab	1	CE	381	Route Surveying Lab	1
CE	383	Str. Steel Design	3	CE	383	Structural Steel Design	3
CE	426	Adv. Constr. Matls.	3	CE	426	Adv. Construction Matls.	3
CE	436	Design / Constr. Inte.	3	CE	436	Design / Constr. Integration	3
CE	440	Masonry Constr.	3	CE	440	Masonry Construction	3
CE	441	Masonry Constr. Lab	1	CE	441	Masonry Construction Lab	1
CE	444	Bridge Engineering	3	CE	444	Bridge Engineering	3
CE	462	Hydraulic Eng.	3	CE	462	Hydraulic Engineering	3
CE	474	CE Design Project	1-3	CE	474	Civil Eng. Design Project	1-3
CE	475	Topics in Civil Eng.	3	CE	475	Sel. Topics in Civil Eng.	3
CE	476	Highway Constr.	3	CE	476	Highway Construction	3
CE	486	Steel & Con. Constr.	3	CE	486	Steel & Concrete Constr.	3
CE	490	UK-CE Topics (Fall)	3	CE	490	UK-CE Sel. Topics (Fall)	3
CE	491	UK-CE Topics (Spr)	3	CE	491	UK-CE Sel. Topics (Spr)	3
CM	363	Constr. Est. & Bid.	3	CM	363	Constr. Est. and Bidding	3
CM	400	Constr. Admin.	3	CM	400	Constr. Administration	3
CM	426	Construction Law	3	CM	426	Construction Law	3
EE	350	Fund. Electrical Eng.	4	EE	350	Fund. of Electrical Eng.	4
EM	313	Dynamics	3	EM	313	Dynamics	3
GISC	317	Geog. Info. Systems	4	GISC	317	Geog. Info. Systems	4
				<b>ME</b>	<b>220</b>	<b>Eng. Thermodynamics</b>	<b>3</b>
				<b>GISC</b>	<b>316</b>	<b>Fundamentals of GIS</b>	<b>4</b>



Prefix	#	Course Title	Hrs.	Prefix	#	Course Title	Hrs.
				GEOL	308	Structural Geology	4
				GEOL	310	Global Hydrology	3
				GEOL	415	Environmental Geology	3
				ENGR	400	Systems Engineering	3
				AMS	305	Building Codes	3
				AMS	325	Surv. of Building Systems	3
				MATH	350	Adv. Engineering Math	3

**\*\*Proposed List of Courses to Satisfy the Science or Math Elective**

Prefix	#	Course Title	Hrs.
PHYS	265/266	University Physics II & Lab	4/1
MATH	307	Linear Algebra	3
MATH	370	Applied Tech. in Mathematics	3
STAT	301	Prob. & Applied Statistics	3
CHEM	222/223	College Chemistry II & Lab	3/2
GEOG	280	Envir. Sc. & Sustainability	4
GEOL	311	General Oceanography	3
GEOL	420	Geomorphology	4
GEOL	445	Aqueous Geochemistry	3
GEOL	465	Geophysics	3

**CE Current Program:**

Students must have a grade of “C” or better in:

- All premajor courses,
- All math courses,
- EM 302 or 303 Mechanics of Deformable Solids,
- All CE courses including technical electives (except for one (1) 400-level CE course).

**CE Proposed Program:**

Students must have a grade of “C” or better in:

- All premajor courses,
- All math courses,
- **Science or math elective,**
- EM 302 or 303 Mechanics of Deformable Solids,
- All CE courses including technical electives (except for one (1) **300-level or 400-level** CE course),

**4. Rationale for the proposed program change:**

- Currently, the CE program requires CE 305 Risk Analysis or STAT 301 Probability and Applied Statistics. Moving forward, the program would like to make CE 305 a

required course. STAT 301 will become one of the options for the math or science elective requirement. (See the bullet in this section.)

- The faculty want to add choices outside of the CE program to the options of approved technical elective courses. However, most of the electives taken by students should come from the CE program since the degree is in civil engineering. Thus, 6 of the 9 technical elective courses shall come from CE prefixed courses.
- PHYS 265/266 University Physics II and Lab cover topics on electricity and magnetism. For many years these topics were on the fundamentals of engineering (FE) exam that civil engineering students had to take on their way to becoming licensed professional engineers. However, these topics have recently been removed from the exam. Therefore, the program would like to move PHYS 265/266 from the list of required courses to the list of options for the math or science elective requirement. This will create greater flexibility and choice for students.
- Students are already allowed to get a single “D” in a 400-level CE course. The CE program would like to extend this policy to a 300 level course. A student will only be allowed one (1) grade of “D” in a single 300-level or 400-level CE course.

5. **Proposed term for implementation:** Fall 2016

6. **Dates of prior committee approvals:**

Department of Engineering

9/24/2015

Ogden College Curriculum Committee

Undergraduate Curriculum Committee

University Senate



Proposal Date: 09/30/2015

**Ogden College of Science and Engineering  
Potter College of Arts & Letters  
Department: Dean's Office  
Proposal to Create a New Course  
(Action Item)**

Contact Person: Rodney King, rodney.king@wku.edu, 5-6910  
Cathleen Webb, cathleen.webb@wku.edu, 5-6181  
Andrew McMichael, andrew.mcmichael@wku.edu, 5-6538

**1. Identification of proposed course:**

- 1.1 Course prefix (subject area) and number: BDAS 300
- 1.2 Course title: The Science of Fermentation in Brewing and Distilling
- 1.3 Abbreviated course title: Fermentation Microbiology
- 1.4 Credit hours: 3
- 1.5 Grade type: Standard letter grade
- 1.6 Prerequisites: None
- 1.7 Course description: Introduction to the basic scientific principles that govern the fermentation process, with particular application to brewing and distilling.

**2. Rationale:**

2.1 Reason for developing the proposed course:

The science of zymology is foundational to the understanding of biology and chemistry. It also forms the basis for industries as diverse as brewing and distilling, fuel production, food manufacturing, and the manufacture of chemical and biological weapons. Students who wish to understand a wide range of applications for biology and chemistry must understand the principles of fermentation.

Currently, several courses in the Departments of Chemistry and Biology cover some of the basic principles of fermentation. These include BIOL 226/227, which examines morphological, cultural, and biochemical characteristics of important groups of bacteria. BIO/CHEM 446, BIO/CHEM 447, BIO/CHEM 467 address biochemical compounds and their role in intermediary metabolism (including fermentation), enzyme activity and energetics.

However, none of these classes focus specifically on the principles of fermentation. The creation of this class will provide students with a focused, intensive study of fermentation, which will better prepare them for other courses in their fields. The particular focus here is on the brewing and distilling industries, which are a fast-growing segment of the economy of Kentucky and the United States. This course will therefore also give students a focused study in an area critical to workforce development.

This course will also serve as a foundational course for the certificate, minor, and major in Brewing and Distilling Arts & Sciences that is currently under development.

- 2.2 Projected enrollment in the proposed course: 10 students/section. We anticipate increased demand for the course as the BDA program becomes established.
- 2.3 Relationship of the proposed course to courses now offered by the department: Some similar content is covered in Biol226/227 (Microbial Biology and Diversity) which examines morphological, cultural, and biochemical characteristics of important groups of bacteria. BIO/CHEM 446, BIO/CHEM 447, BIO/CHEM 467 address biochemical compounds and their role in intermediary metabolism (including fermentation), enzyme activity and energetics. However, this new course focuses exclusively on fermentation microbiology and will serve as a foundation for the certificate, minor or major in the WKU BDA program.
- 2.4 Relationship of the proposed course to courses offered in other departments: There is currently no similar process-oriented course that focuses exclusively on the microbiology of fermentation.
- 2.5 Relationship of the proposed course to courses offered in other institutions:

A number of our benchmark institutions offer courses with similar content. However, none of these programs teach courses in conjunction with a corporate partner. In addition, the brewing science programs offered at these benchmarks tend to be exclusively science-focused, without the integration of science, arts, and humanities.

Appalachian State offers a Fermentation Sciences Program. Their Principles of Fermentation Sciences (FER1000; 3 credits) covers the history, culture, and fundamental science of the fermentation processes, basic food science, microbiology, chemistry, biology, natural products chemistry and nutrition. Students are exposed to the basic methods and principles behind the fermentation process including production of cheese, bread, vegetables, meats, beer, wine, bio-fuels and distilled products. An upper level course, Brewing Science and Analysis (FER 4200, 4 credits), covers the chemical and physical processes that go into brewing malted beverages, including the choice of the hops, malt, and yeast varieties and how they are combined to produce specific styles and flavors of beers. Flavor and aroma compounds are quantified by students.

Central Michigan University's Fermentation Program is offered through the College of Science and Technology: It is a 16-credit-hour Undergraduate Certificate designed for degree seeking students of any major and non-degree-seeking students who want to understand the science and technology involved in brewing craft beer. It is designed to prepare students for entry or advancement in the brewing industry or advanced studies in fermentation science or food science. Their Applied Fermentation Science 3(SCI 322; 1-5 credits) course is a practical

application of fermentation science principles in the production and analysis of beer and their Fundamentals of Fermentation Science (SCI 320; 3 credits) focuses on the biochemistry and microbiology involved in the process of brewing beer.

Eastern Kentucky University has a new Fermentation Program. Their Fermentation Microbiology course (FMT 540; 3 credits) focuses on the biochemistry, genetics, and behavior of microorganisms for the production of fermented beverages. In their Fermentation Project Lab. (FMT 549; 2 credits) students perform an independent capstone project where they decide on the process to make a final fermentation product.

Ohio University offers a Brewing Science course called “The Principles of Brewing Science” (CHEM 4501; 3 credits) which aims to demonstrate fundamental principles and concepts of biochemistry, physiology, microbiology, and plant biology through beer brewing.

A number of benchmark schools including Central Michigan, Ball State, Middle Tennessee State, Northern Illinois and Southern Mississippi offer courses in Applied and Environmental Microbiology. These are generally upper level, 3 credit hour courses that cover the microbiology of food, milk, water, sewage, and soils and the fundamentals of environmental and industrial microbiological applications. None of these courses focus exclusively on fermentation microbiology and its application to brewing and distilling.

### **3. Discussion of proposed course:**

3.1 Schedule type: C

3.2 Learning outcomes:

By the end of the course, students should be able to:

- Explain the brewing process.
- Use common brewing equipment and reagents safely and successfully
- Explain the purpose of each step in the brewing process and identify potential steps where unwanted bacterial and or yeast contamination could be introduced.
- Learn to culture bacteria and yeast
- Formulate brewing plan, generate, record and organize brewing data (using tables, diagrams and drawings as appropriate), analyze and interpret the data, and draw logical conclusions based upon collected data and the final fermented product.
- Identify and describe different yeast types
- Identify, Describe and Differentiate between bacterial cells and yeast cells
- Describe and differentiate between bacterial growth and yeast growth
- Describe parameters that affect the growth of microorganisms
- Describe ways to control the growth of microorganisms
- Explain different sanitization techniques and apply these techniques to in-class brewing projects
- Discuss the overall scientific contributions of Louis Pasteur and his particular contributions to fermentation science

3.3 Content outline:

- History of Fermentation
  - Contributions of Louis Pasteur
- Microbiological Principles
  - Aseptic technique
    - Sterility vs Disinfection vs Sanitization vs Antiseptics
  - Safe handling of microbes
  - Proper disposal of bio-hazardous waste
  - Features of microbial cells
    - Bacteria vs Yeast
    - Types of bacteria and their impact the brewing process
    - Types of yeast and their impact of the brewing process
  - Bacterial nutrition and growth
    - Culturing bacteria and yeast
    - Parameters that affect microbial growth
      - Antimicrobial properties of Hops
- Microscopy
  - Basic principles of microscopy
  - Cellular morphology of bacterial and yeast cells
- Biochemistry of Fermentation
  - Cellular Metabolism
  - Basic enzymology
  - How is cellular energy generated?
- Brewing projects
  - Evaluate the effect of different Hops additions
  - Evaluate the effect of different yeast strains
  - Set up and maintenance of research notebook
  - Presentation of scientific data

3.4 Student expectations and requirements: Proper laboratory notebook maintenance, exams to measure content mastery, brewing projects

3.5 Tentative texts and course materials:

Materials will vary from semester to semester. Among the standard texts in the field are:

- Pasteur and Modern Science (Dubos, ASM press; ISBN 1555811442),
- The complete Joy of Homebrewing (Papazian, Harper Collins; ISBN 0060531053)
- Brewing Microbiology (Springer: ISBN-13: 978-1461348580)
- Yeast: The Practical Guide to Beer Fermentation (Brewers Association; ISBN-10: 0937381969)
- Bamforth, Charles. *Beer: Tap Into the Art and Science of Brewing*. (New York: Oxford University Press, 2009)

- Fix, George. *Principles of Brewing Science: A Study of Serious Brewing Issues*. (Boulder, Co.: Brewers Publications, 1999)
- Palmer, John and Kaminski, Colin. *Water: A Comprehensive Guide for Brewers*. (Boulder, Co.: Brewers Publications, 2013)
- Rogers, Adam. *Proof: The Science of Booze* (Boston: Houghton Mifflin, 2014)
- Russell, Inge, and Stewart, Graham, eds. *Whisky: Technology, Production, and Marketing*. (Boston: Elsevier, 2014).

**4. Resources:**

- 4.1 Library resources: Adequate. Access to relevant literature and suggested readings.
- 4.2 Computer resources: Adequate.

**5. Budget implications:**

- 5.1 Proposed method of staffing: Current staffing is sufficient.
- 5.2 Special equipment needed: None beyond what is already available.
- 5.3 Expendable materials needed: Brewing supplies (hops, malted grain, water and active yeast cultures) sanitization supplies, various tubing and airlocks and glassware.
- 5.4 Laboratory materials needed: None beyond what is already available.

**6. Proposed term for implementation: Spring 2016**

**7. Dates of prior committee approvals**

OCSE/PCAL Dean's Offices	10/01/2015 _____
Ogden College Curriculum Committee	_____
Undergraduate Curriculum Committee	_____
University Senate	_____

**Attachment: Bibliography, Library Resources Form, Course Inventory Form**

Proposal date: 20 September, 2015

**Potter College of Arts & Letters  
Ogden College of Science and Engineering  
Proposal to Create a New Course  
(Action Item)**

Contact Person: Contact Person: Andrew McMichael [andrew.mcmichael@wku.edu](mailto:andrew.mcmichael@wku.edu) 745-6538  
Cathleen Webb [Cathleen.webb@wku.edu](mailto:Cathleen.webb@wku.edu) 745-4448

**1. Identification of proposed course:**

- 1.1 Course prefix (subject area) and number: BDAS 495
- 1.2 Course title: Internship in Brewing/Distilling
- 1.3 Abbreviated course title: Brewing/Distilling Internship  
(maximum of 30 characters or spaces)
- 1.4 Credit hours: 1-3 Variable credit (yes)
- 1.5 Grade type: Standard Letter Grade
- 1.6 Prerequisites/corequisites: Senior standing and consultation with a designee of the Ogden College or Potter College Dean's office.
- 1.7 Course description: On-site experience in a brewery or distillery, conducted under the supervision of the program coordinator and local personnel. Experience could include but is not limited to brewing, distilling, marketing, management, or other industry-related work. Can be repeated for up to six credit hours.

**2. Rationale:**

- 2.1 Reason for developing the proposed course: The craft brewing and distilling industries are a fast-growing segment of the U.S. and Kentucky economies. Brewing and distilling contributes an annual payroll of around \$250 million each, with a direct economic impact—including retail, tourism such as the Bourbon Trail, and associated industries such as agriculture, construction, and manufacturing—of more than two billion dollars. Kentucky alone employs more than three hundred people in breweries and thousands more in brewing-related jobs, while the distilling industry employs more than three thousand in distilleries and thousands more in related jobs.

This course helps meet a workforce need in the Commonwealth and in the United States by placing students into a fast-growing segment of the economy, while at the same time providing an atmosphere in which students in various majors can gain valuable hands-on experience.

Over the past year we have gotten many requests from students and from people in the brewing and distilling industries to help with internship placements. Having an internship course specific to the industry will help students once they enter the job market.

- 2.2 Projected enrollment in the proposed course: 1 – 2 per year, based on student interest as well as surveys of brewers and distillers in Kentucky.

- 2.3 Relationship of the proposed course to courses now offered by the department: None.
- 2.4 Relationship of the proposed course to courses offered in other departments: Several departments have internship courses, but none specific to brewing and distilling. Among the many existing internship courses are CHIN 389: Internship in Chinese, COMM 489: Internship in Communication; ENV 491: Internship in Environmental, Health, and Safety; HCA 449: Internship in Healthcare Administration; HMD 410: Internship in Hospitality Management.
- 2.5 Relationship of the proposed course to courses offered in other institutions: Topic-specific internship courses are common at universities across the United States. The brewery-specific internship courses at U.S. universities include: the University of the Sciences' Brewing Sciences Certificate uses BS776 – Brewing Science Internship; The University of California, San Diego's Brewing Certificate offers BREW-40011: Internship; Regis University's Certificate in Applied Craft Brewing offers BREW 498 Brewing Internship; Flathead Valley Community College offers BREW 298: Internship—Professional Brewing.

**3. Discussion of proposed course:**

- 3.1 Schedule type: N
- 3.2 Learning Outcomes: By the end of the course, students should be able to
- Apply knowledge from their major/minor/certificate field to the brewing and distilling industry.
  - Understand how their major/minor/certificate field relates to the brewing and/or distilling industries on a practical level.
- 3.3 Content outline:
- Under the supervision of a major professor and/or a designee of the Ogden College or Potter College Dean's office, the student will apply his/her knowledge to assignments of value within the brewing or distilling industry.
  - Students will write a final essay analyzing their experience within the context of what they had learned in their major/minor/certificate field.
- 3.4 Student expectations and requirements: Students will apply for an internship through one of their major/minor/certificate professors, or a designee of the Ogden College or Potter College Dean's office. If the application comes through a major/minor/certificate professor, that professor will work with a designee of the Ogden College or Potter College Dean's office to help the student review and understand the internship policies as outlined by the Career Services Center. The student will complete a learning plan that will be approved by the faculty supervisor and/or a designee of the Ogden College or Potter College Dean's office, and a supervisor from the cooperating organization. An end-of-internship evaluation of the student's performance will come from the organization's supervisor. The faculty advisor will assign a grade based on the supervisor's report and the student's final essay.
- 3.5 Tentative texts and course materials: Will vary based on the placement.

**4. Resources:**

- 4.1 Library resources: Adequate
- 4.2 Computer resources: Adequate

**5. Budget implications:**

- 5.1 Proposed method of staffing: One of the co-directors, or a faculty member in the students' major field, will supervise and evaluate the student's internship in conjunction with the employer.
- 5.2 Special equipment needed: None
- 5.3 Expendable materials needed: None
- 5.4 Laboratory materials needed: None

**6. Proposed term for implementation:** Spring 2016

**7. Dates of prior committee approvals:**

Department/ Unit	PCAL/OCSE Dean's Offices	<u><b>20 Sept 2015</b></u>
___Ogden___ College Curriculum Committee		_____
Professional Education Council (if applicable)		_____
General Education Committee (if applicable)		_____
Undergraduate Curriculum Committee		_____
University Senate		_____



**Potter College of Arts & Letters  
Ogden College of Science and Engineering  
Proposal to Create a New Certificate Program  
(Action Item)**

Contact Person: Contact Person: Andrew McMichael [andrew.mcmichael@wku.edu](mailto:andrew.mcmichael@wku.edu) 745-6538  
Cathleen Webb [Cathleen.webb@wku.edu](mailto:Cathleen.webb@wku.edu) 745-4448

**1. Identification of program:**

- 1.1 Program title: Brewing and Distilling Arts & Sciences
- 1.2 Required hours in program: 12-15
- 1.3 Special information: None
- 1.4 Catalog description: Humans have been brewing alcohol since the dawn of recorded history, and distilling stretches back over a thousand years. Brewing and distilling play a major role in the Kentucky and U.S. economy. Industries as diverse as farming, tourism, construction, and retail all rely on, and contribute to alcohol production.

This multidisciplinary certificate is designed to complement an existing major in a related field, by providing a background understanding of topics related to the brewing and distilling industries—the science, the business, and the history, as well as an internship—students need to become competitive in the marketplace.

Students will take four courses for the certificate. BDAS: 300 is an intensive introductory study of the science of fermentation. ENT: 312 is an introduction to entrepreneurship. HIST:531 examines the history of brewing and distilling, and BDAS: 495 is a variable-credit internship placement in a sector of the brewing and distilling industry, in consultation with a faculty supervisor.

- 1.5 Classification of Instructional Program Code (CIP):

**2. Learning outcomes of the proposed certificate program:**

1. Upon completion of this certificate, students should:
  - Have a basic familiarity with the brewing and distilling industries, including the underlying science, the management and business, and history; and
  - Have experience, through an internship, in a distillery or brewery.

**3. Rationale:**

- 3.1 Reason for developing the proposed certificate program:

The craft brewing and distilling industries are a fast-growing segment of the U.S. and Kentucky economies. Brewing and distilling contributes an annual payroll of around \$250 million each, with a direct economic impact—including retail, tourism such as the Bourbon Trail, and associated industries such as agriculture, construction, and manufacturing—of more than two billion dollars. Kentucky alone employs more than three hundred people in breweries and thousands more in brewing-related jobs, while the distilling industry employs more than three thousand in distilleries and thousands more in related jobs. Currently, WKU offers no options that meet workforce needs associated with the brewing and distilling industries, and employers (even those in-state) look to interns and skilled employees from outside the state to meet their workforce needs.

Brewing certificates are becoming increasingly popular at universities around the country, and a few certificates in distilling have begun to crop up. The majority of these

are at two-year colleges or extension campuses of existing four-year universities. Virtually all of the certificates are located in the sciences—either food sciences or chemistry of one kind or another.

In informal surveys of distilleries and breweries around the country and in Kentucky, brewers and distillers consistently stated that they wished they had had, and that they wanted new employees to have, a broad base of skills. Those surveys, conducted in 2010 and 2014 showed that industry employers wanted graduates with an education that spanned multiple disciplines, including the arts, the sciences, the humanities, business, and the health sciences fields.

This certificate will give students a background in the fundamentals of the brewing and distilling industries—the science, the business, and the history, as well as an internship—they need to become competitive in the marketplace. The certificate does so by providing a traditional, broad-based liberal arts and sciences education that speaks to the core mission of WKU.

- 3.2 Relationship of the proposed certificate program to other programs now offered by the department: None.
- 3.3 Relationship of the proposed certificate program to certificate programs offered in other departments: Many departments offer certificate programs. This was modeled on a standard 12-hour requirement, with extra hours allowed for extended or repeated internships. Some examples of certificate programs at WKU include: the Automation, Food Processing and Technology, Six Sigma and Quality certificates in AMS; the Food Sciences Certificate in Biology; the Land Surveying Certificate in Engineering; the Advanced Professionalism Certificate in the Gordon Ford College of Business; and the Middle East Studies Certificate in Potter College.
- 3.4 Projected enrollment in the proposed certificate program: 5 – 10 per year, based on informal surveys of students, as well as interest from within the industry.
- 3.5 Similar certificate programs offered elsewhere in Kentucky and in other states (including programs at benchmark institutions): Craft brewing certificates are very popular right now, and dozens exist across the country. Ours has been under discussion for about a year, which allowed two Kentucky Universities to get programs moving. Eastern Kentucky University has a Fermentation Sciences Program as part of their B.A. in Chemistry. It requires additional courses in science and business. The University of Kentucky recently approved a Undergraduate Certificate in Distillation, Wine and Brewing Studies through their Department of Horticulture. It is focused on science. Both of these programs have a different focus than we plan.

Grand Rapids Community College has a Craft Brewing Certificate as part of their Institute for Culinary Education. Portland State University offers a Business of Craft Brewing Certificate as part of their Center for Executive and Professional Education. Central Washington University offers a science-focused Craft Brewing Certificate through their Continuing Education office. The University of the Sciences offers a Graduate-level Brewing Science Certificate. San Diego State University offers a Professional Certificate in the Business of Craft Beer. Schoolcraft College offers a Brewing and Distilling Technology certificate of 24 hours.

- 3.6 Relationship of the proposed certificate program to the university mission and objectives: This program speaks to the part of the university mission that looks to “[prepare] students of all backgrounds to be productive, engaged, and socially responsible citizen-leaders of a global society.” The Certificate in Brewing and Distilling Arts & Sciences speaks to workforce needs, and engages students in an important component of American culture, history, technology, science, and economy. The interdisciplinary nature speaks to the nature of a university—to prepare students to enter the workforce with an education that comes from a wide variety of subjects that reinforces and goes beyond what they would

get by simply taking their general education classes.

4. **Curriculum:**

Course Title	CR
BDAS 300—The Science of Fermentation in Brewing, and Distilling	3
ENT 312—Entrepreneurship	3
HIST 341—The Cultural History of Alcohol	3
BDAS 495—Internship in Brewing and Distilling	3-6
Total	12-15

5. **Budget implications:** None. This certificate requires no additional faculty, nor any additional material resources.

6. **Proposed term for implementation:** Spring, 2016

7. **Dates of prior committee approvals:**

Department/ Unit \_\_\_\_\_

College Curriculum Committee \_\_\_\_\_

Contact with Office of Academic Affairs \_\_\_\_\_

Professional Education Council (if applicable) \_\_\_\_\_

Undergraduate Curriculum Committee \_\_\_\_\_

University Senate \_\_\_\_\_

Board of Regents \_\_\_\_\_

## CURRICULUM COMMITTEE, OCSE, STANDING RULES

### I. Purpose and Functions

- A. To review recommendations concerning undergraduate college and university curricula which are relevant to the Ogden College of Science and Engineering and to the welfare and best interests of the University, its students, and its faculty.
- B. To render decisive action on matters of undergraduate curriculum and academic policy which affect only the College of Science and Engineering.
- C. To submit for consideration to the University Curriculum Committee all approved recommendations which do not qualify for final action under the conditions of Item B.
- D. To initiate, create or otherwise instigate thought, ideas, and action which will promote the best possible continuing improvement of all phases of science, mathematics, and technology at Western Kentucky University.

### II. Membership

- A. The committee membership shall consist of one elected faculty representative from each Department/Academic Unit. Faculty representatives shall be elected for two years. The Departments of Biology, Computer Science, Architectural & Manufacturing Sciences, Mathematics, and Physics & Astronomy shall elect members in even-numbered years, and the Departments of Agriculture, Chemistry, Engineering, Geography & Geology, Psychological Sciences and SkyTeach, in odd-numbered years. The faculty representatives shall be elected in the spring semester to take office at the beginning of the following fall semester. Other faculty members may be invited by any member of the Committee to attend meetings as associate contributors without voting privileges. The Dean, Associate Dean and Department Heads may attend in an advisory capacity and will be considered ex officio members of the committee.
- B. The Chairperson of the Committee shall be elected by the membership at the last meeting in the spring and will assume the chair at the first meeting in the fall. The chairperson may designate an Acting Chair in his or her absence.
- C. An absent member may designate an alternate to attend a meeting or give their proxy to another member. A member of the Ogden Curriculum Committee cannot hold more than one proxy. The chairperson should be notified by email if a proxy has been given.

### III. Meetings

- A. All meetings will be called by the Committee Chairperson. The Curriculum Committee shall meet once a month during the academic year unless changed by a vote of the Committee. The date, time, and place of the meetings are to be determined by the Committee Chairperson.
- B. A quorum will consist of a simple majority of all members.
- C. A legal vote will consist of a simple majority of the quorum.
- D. A member may designate a proxy by email to the Chairperson in advance of the meeting. The proxy will count toward the determination of a quorum.
- E. The meeting agenda will be posted electronically on the Ogden College Curriculum Committee web site at least three days in advance of the meeting.
- F. Requests for items to be included on the agenda will be submitted electronically to the Dean's Office no later than six days before the meeting.

#### IV. Procedural Rules and Regulations

Guidelines for procedures in all Committee activities will be established and reviewed periodically to insure the maximum effectiveness and efficiency of the Curriculum Committee.

- A. The privilege of speaking to the Committee will be acknowledged by the Chair. Special circumstances which involve matters that may be expedited by open discussion without addressing the Chair will be recognized and declared by the Chair of the Committee.
- B.
  1. All recommendations will be presented and outlined in the agenda.
  2. Any action originating in the OCSE Curriculum Committee shall be given a first and second reading before final action is taken on the proposal or recognition.
  3. Recommendations involving amendments to these Standing Rules shall be automatically tabled until the following meeting. Consideration for immediate action can be made only by unanimous consent.
  4. All proposals will be considered for final action at the first reading, unless the Chair or a majority of the members present request a second reading.
- C. If any emergency arises which required immediate action of the Committee, the Chairperson (or Vice-Chair) will use the best possible means of obtaining a majority vote by the members.

- D. Subcommittees may be appointed for special investigations by the Chairperson. Subcommittees may include faculty members who are not members of the Curriculum Committee.
- E. A uniform style of presentation will be adhered to concerning all proposals. The Ogden College Curriculum Committee will adopt the templates and format of proposals utilized by the University Curriculum Committee.

Approved April, 1972  
OCSE Curriculum Committee

Revised October, 1981  
OCSE Curriculum Committee

Revised October, 1984  
OCSE Curriculum Committee

Revised October, 2015  
OCSE Curriculum Committee

DRAFT