**PURDUE UNIVERSITY**
REQUEST FOR ADDITION, EXPIRATION, OR REVISION OF A GRADUATE COURSE
(60000-60000 LEVEL)

**DEPARTMENT**: Agricultural and Biological Engineering  
**EFFECTIVE SESSION**: Spring 2013  
**ROE 55-13**

**INSTRUCTIONS**: Please check the items below which describe the purpose of this request.

- 1. New course with supporting documents (complete proposal form)
- 2. Add existing course offered at another campus
- 3. Expiration of a course
- 4. Change in course number
- 5. Change in course title
- 6. Change in course credit type
- 7. Change in course attributes
- 8. Change in instructional hours
- 9. Change in course description
- 10. Change in course requisites
- 11. Change in semesters offered
- 12. Transfer from one department to another

**PROPOSED**

<table>
<thead>
<tr>
<th>Subject Abbv.</th>
<th>EXISTING:</th>
<th>TERMS OFFERED</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABE</td>
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**Course Number**

<table>
<thead>
<tr>
<th>Proposed</th>
<th>Existing</th>
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<tbody>
<tr>
<td>55700</td>
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**Long Title**: Transport Operations in Food and Biological Systems II

**Short Title**: TFOODIPL & BIO SYST II

**CAMPUS(ES) INVOLVED**
- Calumet
- N. Central
- Fort Ed
- Tech Statewide
- Ft. Wayne
- W. Lafayette
- Indianapolis

**CREDIT TYPE**

<table>
<thead>
<tr>
<th>1. Fixed Credit Cr. Hrs:</th>
<th>2. Variable Credit Range:</th>
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**Schedule Type**

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Recitation</th>
<th>Presentation</th>
<th>Laboratory</th>
<th>Lab Prep</th>
<th>Study</th>
<th>Distance</th>
<th>Clinic</th>
<th>Experimental</th>
<th>Research</th>
<th>Ind. Study</th>
<th>Prac/Obsrv</th>
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**Course Description (Include Requisites/Restrictions):**

Analysis and design of operations, such as dehydration, fermentation, and separation processes. Development of experimental designs. Integration of pilot plant results into the design, operation and scale-up process systems. Emphasis on how the properties of biological materials influence the quality of the processed product. Requisites, Restrictions, and Attributes: ABE 45700 Professor Okos.

**COURSE LEARNING OUTCOMES:**

Self learning/preparation for life long learning. A capacity to apply these principles to the development of typical industrial processes. Develop and conduct an experimental design to identify impact of process variables to improve product quality. An ability to communicate technical information effectively. Improved computer skills. A facility to work in teams. Meeting deadline. Evaluate ethical, global, and societal contemporary issues.

**RECEIVED**
**OCT 2-2-2013**
**OFFICE OF THE REGISTRAR**

**Cross-Listed Courses**

**APPROVED 10/17/13**

**Graduate Council Secretary**

**West Lafayette Registrar**
DEPARTMENT: Agricultural and Biological Engineering

REQUEST FOR ADDITION, EXPIRATION, OR REVISION OF AN UNDERGRADUATE COURSE
(10000-40000 LEVEL)

INSTRUCTIONS: Please check the items below which describe the purpose of this request.

☐ 1. New course with supporting documents
☐ 2. Add existing course offered at another campus
☐ 3. Expiration of a course
☐ 4. Change in course number
☐ 5. Change in course title
☐ 6. Change in course credit/type
☐ 7. Change in course attributes (department head signature only)
☐ 8. Change in instructional hours
☐ 9. Change in course description
☐ 10. Change in course requisites/restrictions
☐ 11. Change in semesters offered (department head signature only)
☐ 12. Transfer from one department to another

PROPOSED:

Subject Abbreviation: ABE
Course Number: 55700
Long Title: Transport Operations in Food and Biological Systems II

EXISTING:

Subject Abbreviation
Course Number
Long Title

TERMS OFFERED:

Check All That Apply:

☐ Fall
☐ Spring
☐ Summer

CAMPUS(ES) INVOLVED:

☐ Calumet
☐ Cont Ed
☐ Ft. Wayne
☐ W. Lafayette
☐ Indianapolis

COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):

Analysis and design of operations, such as dehydration, fermentation, and separation processes. Development of experimental designs. Integration of pilot plant results into the design, operation and scale-up process systems. Emphasis on how the properties of biological materials influence the quality of the processed product.

Requisites, Restrictions, and Attributes: ABE 45700

COURSE ATTRIBUTES: Check All That Apply

☐ 1. Pass/Not Pass Only
☐ 2. Satisfactory-Unsatisfactory Only
☐ 3. Repeatable
☐ 4. Credit by Examination
☐ 5. Special Fees

CREDIT TYPE:

1. Fixed Credit: Cr. Hrs. 3
2. Variable Credit Range: Minimum Cr. Hrs. (Check One) To ☐ Or ☐ Maximum Cr. Hrs. ☐
3. Equivalent Credit: Yes ☐ No ☐

Schedule Type: Minutes Per Week 50 2
Lecture: 50
Recitation: 2
Presentation: 0
Laboratory: 0
Lab Prep: 0
Studio: 0
Distance: 0
Clinic: 0
Experiential: 0
Research: 0
Ind. Study: 0
Prac/Override: 0

Weeks Offered: % of Credit Allocated

CROSS-LISTED COURSES

OFFICE OF THE REGISTRAR
TO: The Faculty of the College of Engineering
FROM: The Faculty of Agricultural and Biological Engineering
RE: New Course ABE 55700

The faculty of the Department of Agricultural and Biological Engineering has approved the following new course. This action is now submitted to the Engineering Faculty with a recommendation for approval.

ABE 55700  Transport Operations in Food and Biological Systems II
Sem. 1, Class 2. Lab 4. Cr. 3.
Requisites, Restrictions, and Attributes: ABE 45700

Description: Analysis and design of operations, such as dehydration, fermentation, and separation processes. Development of experimental designs. Integration of pilot plant results into the design, operation and scale-up process systems. Emphasis on how the properties of biological materials influence the quality of the processed product.

Reason: This course is replacing ABE 55500 (4 credits) with a 3 credit course with the most essential information from that course. The reduction in course content and credit hours will help the Department meet the 128 credit constraint for the Biological Engineering plan of study.

Bernard A. Engel, Professor and Head
Agricultural and Biological Engineering Department

APPROVED FOR THE FACULTY
OF THE SCHOOLS OF ENGINEERING
BY THE ENGINEERING
CURRICULUM COMMITTEE

EGC Minutes 4/13
Date 5/10/2013
Chairman EGC [Signature]
ABE 55700  Transport Operations in Food and Biological Systems II

COURSE CONTACT INFORMATION:

Name: Martin Okos  
Phone Number: 494-1211  
E-mail Address: okos@purdue.edu  
Campus Address: NLSN 1169

Course Description. Analysis and design of operations, such as dehydration, fermentation, and separation processes. Development of experimental designs. Integration of pilot plant results into the design, operation and scale-up process systems. Emphasis on how the properties of biological materials influence the quality of the processed product.

Requisites, Restrictions, and Attributes: ABE 45700

COLLEGE (AGRICULTURE) LEARNING OUTCOMES Addressed by this course

_____ Professional Preparation: Demonstrate proficiency in their chosen discipline that incorporates knowledge skills, technology, and professional conduct.

_____ Scientific Principles: Demonstrate use of the scientific method to identify problems, formulate and test hypotheses, conduct experiments and analyze data, and derive conclusions.

_____ Critical Thinking: Demonstrate critical thinking by using data and reasoning to develop sound responses to complex problems.

_____ Communication: Demonstrate the ability to write and speak with effectiveness while considering audience and purpose.

_____ Teamwork: Demonstrate the ability to work effectively as part of a problem-solving team.

_____ Cultural Understanding: Demonstrate knowledge of a range of cultures and an understanding of human values and points of view of other than their own.

_____ Social Science Principles: Demonstrate ability to apply social, economic, political, and environmental principles to living in a global community.

_____ Civic Responsibility: Demonstrate awareness of civic responsibility to community and society at large.

_____ Lifelong Learning: Demonstrate skills necessary for lifelong learning.

DEPARTMENTAL/PROGRAM LEARNING OUTCOMES Addressed by this course

_____ an ability to apply knowledge of mathematics, science, and engineering

_____ ability to design and conduct experiments, as well as to analyze and interpret data.

_____ an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

_____ an ability to function on multidisciplinary teams
an ability to identify, formulate, and solve engineering problems
an understanding of professional and ethical responsibility
an ability to communicate effectively
the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
a recognition of the need for, and an ability to engage in life-long learning
a knowledge of contemporary issues
an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

GRADUATE STUDENT LEARNING OUTCOMES ADDRESSED BY THIS COURSE

Identify and conduct original research, scholarship and creative endeavors
Effectively communicate their field of study
Think critically, creatively and solve problems in their field of study
Conduct research in an ethical and responsible manner
Demonstrate attributes of professional development consistent with expectations within their field of study

Course outline of Topics/Syllabus

Drying (2 weeks)
Packaging (1 week)
Fermentation (2 weeks)
Membrane Separations (2 weeks)
Gas-Liquid Separations (2 weeks)
Vapor-Liquid Separations (2 weeks)
Liquid Solid Separations (2 weeks)
Physical Separations (1 week)

Reading List/Textbook

Example syllabus

**ABE 55700  Transport Operations in Food and Biological Systems II**

**Textbook and/or other recommended material**


**Course Learning Objectives:**

The emphasis of the course is on overall process design and the integration of unit operation principles and design concepts addressed in ABE 454. More specifically, students are to come away from this course with:

An understanding of the principles and design/scale-up aspects of various unit operations and processes utilized by the biological and food process industries,

1. Self learning/preparation for life long learning
2. A capacity to apply these principles to the development of typical industrial processes,
3. Develop and conduct an experimental design to identify impact of process variables to improve product quality,
4. An ability to communicate technical information effectively,
5. Improved computer skills, and
6. A facility to work in teams.
7. Meeting deadline
8. Evaluate ethical, global, and societal contemporary issues

**Grading Procedure:**

**GRADING POLICY:**  +/- A/B/C/D/F/I

- Algorithm/Design Projects 25%
- Term Project/ Lab/Design 25%
- Exam: 25%
- Homework 25%
### COURSE OUTLINE:

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture Topic</th>
<th>Reading</th>
<th>Lab/design</th>
<th>Due Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Drying</td>
<td>Geankoplis Ch. 9</td>
<td>Design of Experiment Project Mtg</td>
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<tr>
<td>2</td>
<td>Drying</td>
<td>Geankoplis Ch. 9</td>
<td>Drying Process Design Exam</td>
<td>Homework</td>
</tr>
<tr>
<td>3</td>
<td>Drying &amp; Packaging</td>
<td>Handout</td>
<td>Drying Process</td>
<td>Homework</td>
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<tr>
<td>4</td>
<td>Fermentation</td>
<td>Handout</td>
<td>Isotherm &amp; Drying</td>
<td>Homework Design Phase 1 and 2</td>
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<td>Fermentation</td>
<td></td>
<td>Semester Process Design</td>
<td>Homework Dryer Design Presentation</td>
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<tr>
<td>6</td>
<td>Membrane Separations</td>
<td>Geankoplis Ch. 13</td>
<td>Semester Project Mtg</td>
<td>Homework</td>
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<td>7-8</td>
<td>Gas-Liquid Separations</td>
<td>Geankoplis Ch. 10</td>
<td>Exam</td>
<td>Homework Phase 3 and 4</td>
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<td>9-10</td>
<td>Vapor-Liquid Separations</td>
<td>Geankoplis Ch. 11</td>
<td>Fermentation Design</td>
<td>Homework</td>
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<tr>
<td>11-12</td>
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<td>Geankoplis Ch. 12</td>
<td>Semester Project Mtg</td>
<td>Homework</td>
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<td>13</td>
<td>Physical Separations</td>
<td>Geankoplis Ch. 14</td>
<td>Separation Design</td>
<td>Homework Phase 5 and 6</td>
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<tr>
<td>14</td>
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<td>Laboratory Reports Oral presentation</td>
<td>Homework</td>
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<td>Final Presentation Phase 7 and 8</td>
<td>Final Report</td>
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<td>Final Exam</td>
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<td>Exam</td>
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