

UNIVERSITY OF ILLINOIS  
AT URBANA-CHAMPAIGN

EP.10.19

Office of the Provost and Vice Chancellor  
for Academic Affairs

Swanlund Administration Building  
601 East John Street  
Champaign, IL 61820



October 29, 2009

Abbas Aminmansour, Chair  
Senate Committee on Educational Policy  
Office of the Senate  
228 English Building, MC-461

Dear Professor Aminmansour:

Enclosed is a copy of a proposal from the College of Engineering to revise the BS in Agricultural and Biological Engineering.

This proposal has been approved by the College of Engineering Executive Committee. It now requires Senate review.

Sincerely,

A handwritten signature in cursive script that reads "Kristi A. Kuntz".

Kristi A. Kuntz  
Assistant Provost

KAK/dkk

Enclosures

c: I. Adesida  
J. Abelson  
R. Dennis  
A. Hansen  
S. Kamin  
C. Livingstone  
M. Pleck  
M. Rood  
K. C. Ting  
C. Tucker

UNIVERSITY OF ILLINOIS  
AT URBANA-CHAMPAIGN

College of Engineering  
Executive Committee  
306 Engineering Hall, MC-266  
1308 West Green Street  
Urbana, IL 61801



RECEIVED  
11/11/09  
OFFICE of the PROVOST

October 23, 2009

Kristi Kuntz  
Assistant Provost  
217 Swanlund Administration Building  
MC-304

Via: Ilesanmi Adesida, Engineering College

Dear Ms. Kuntz:

The College of Engineering Executive Committee has reviewed and approved the following:

Program Revision: "B.S. in Agricultural and Biological Engineering"

Attached is a copy of the request.

Sincerely yours,

Samuel N. Kamin, Secretary  
Executive Committee

Approval Recommended:

Ilesanmi Adesida, Dean  
College of Engineering

10/23/09  
Date

SNK/bro  
Enclosure  
c: Kuan C. Ting  
John R. Abelson  
Michael Pleck  
Mark Rood  
Alan Hansen  
Robin Dennis

Senate Educational Policy Committee  
Proposal Check Sheet

PROPOSAL TITLE (Same as on proposal): Establishment of Two Concentrations (Agricultural Engineering and Biological Engineering) and Discontinuance of the Food and Bioprocess Engineering Concentration in the B.S. in Agricultural and Biological Engineering, in the Department of Agricultural and Biological Engineering, College of Engineering

PROPOSAL TYPE (Please select all that apply below):

A.  Program and degree proposals

1. This proposal is for a graduate program or degree

Yes  No

2. Degree proposal (e.g. B.S.A.E., M.S.C.E.)

New degree - - please name new degree name: \_\_\_\_\_

Revision of an existing degree - - please name of the existing degree to be revised:  
B.S. in Agricultural and Biological Engineering

3. Major proposal (disciplinary focus e.g. Mathematics, Mechanical Engineering)

New major - - please name new major: \_\_\_\_\_

Revision of an existing major - - please indicate the name of the existing major to be revised: \_\_\_\_\_

4. Concentration proposal (e.g. Financial Planning)

New concentration - - please name new concentration: Agricultural Engineering ;  
Biological Engineering (two concentrations)

Revision of an existing concentration - - please name the existing concentration to be revised: \_\_\_\_\_

## 5. Minor proposal (e.g. Cinema Studies)

 New minor - - please name new concentration: \_\_\_\_\_ Revision of an existing minor - - please name the existing concentration to be revised:  
\_\_\_\_\_6.  Proposal for terminating an existing degree, major, concentration or minorPlease name and nature of the existing degree, major, concentration or minor:  
Concentration in Food and Bioprocess Engineering7.  Proposal for a multi-institutional degree between Illinois (UTUC) and a foreign institution

Please name the existing Illinois degree or program: \_\_\_\_\_

Please name the partnering institution: \_\_\_\_\_

B.  Proposal for renaming existing academic units (college, school, department, or program)

Please provide the unit's current name: \_\_\_\_\_

Please provide the unit's proposed new name: \_\_\_\_\_

C.  Proposal for re-organizing existing units (colleges, schools, departments, or programs) Change in status of an existing and approved unit (e.g. change from a program to department). Please indicate current unit name including status: \_\_\_\_\_ Transfer an existing unit

Please provide the current unit's name and home: \_\_\_\_\_

Please provide the new home for the unit: \_\_\_\_\_

 Merge two or more existing units (e.g. merge department A with department B)

Name and college of unit one to be merged: \_\_\_\_\_

Name and college of unit two to be merged: \_\_\_\_\_

 Terminate an existing unit. Please provide the current unit's name and status: \_\_\_\_\_D.  Other educational policy proposals (e.g. academic calendar, grading policies, etc.)

Please indicate the nature of the proposal: \_\_\_\_\_



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## Proposal to the Senate Educational Policy Committee

**PROPOSAL TITLE:** Establishment of Two Concentrations (Agricultural Engineering and Biological Engineering) and Discontinuance of the Food and Bioprocess Engineering Concentration in the B.S. in Agricultural and Biological Engineering, in the Department of Agricultural and Biological Engineering, College of Engineering.

**SPONSOR:** Alan C. Hansen, Professor in the Department of Agricultural and Biological Engineering, 333-2969, [achansen@illinois.edu](mailto:achansen@illinois.edu).

**COLLEGE CONTACT:** Charles L. Tucker III, Associate Dean, College of Engineering, 244-3822, [ctucker@illinois.edu](mailto:ctucker@illinois.edu).

### BRIEF DESCRIPTION:

This proposal is a revision of the B.S. in Agricultural and Biological Engineering. The proposal discontinues the current concentration in Food and Bioprocess Engineering and establishes a new concentration in Agricultural Engineering and a new concentration in Biological Engineering. The Agricultural and Biological Engineering major is maintained at 128 hours (with the exception of students electing the Food and Bioprocess Engineering Concentration, which required 132 hours) but students will be required to choose one of two distinct concentration paths for their degree. Specific changes in the proposed curriculum include:

1. *New Concentration in Agricultural Engineering:* This concentration focuses on the practice of engineering primarily in the agricultural domain of the field of agricultural and biological engineering (ABE) with students required to select a coherent set of courses in consultation with their advisor that constitutes a specialization in this domain such as off-road equipment engineering, soil and water resources engineering, and renewable energy systems. The concentration consists of 14 hours of required core technical courses and 23 hours of technical electives.
2. *New Concentration in Biological Engineering:* This concentration focuses on the practice of engineering in the realm of living systems in agriculture, food, energy, the environment, and related biological systems. This extends beyond the singular area of study currently available as the Food and Bioprocess Engineering Concentration with students again required to select coherent sets of courses that constitute specializations in this domain such as bioenvironmental engineering (for example greenhouse and livestock building design), ecological engineering, food and bioprocess engineering, and nanoscale biological engineering. The concentration consists of 16 hours of required core technical courses and 21 hours of technical electives.

3. *Modify the subset of the Agricultural and Biological Engineering technical core common to both concentrations:* A small adjustment will be made to the common technical core course set for the B.S. in Agricultural and Biological Engineering with an increase in total credit hours from 27 to 28.
4. *Discontinue the current Concentration in Food and Bioprocess Engineering:* This area of study in the current Concentration in Food and Bioprocess Engineering is listed among the examples of possible student-elected and advisor-approved choices of specialization under the Biological Engineering Concentration.

#### **JUSTIFICATION:**

In 2003, the Department of Agricultural Engineering changed its name to the Department of Agricultural and Biological Engineering. In 2008, the degree names for the B.S., M.S., and Ph.D. programs were renamed as Agricultural and Biological Engineering. The proposal in 2007 for changing the degree name to Agricultural and Biological Engineering explained the national changes in the discipline with the increase of the biological engineering segment. This proposal completes the Department's long term plan of modernizing the curriculum to allow students to select a set of courses more directly related to their career interest while maintaining program rigor. These changes will offer students the following advantages:

1. *New Concentration in Agricultural Engineering:* This concentration will allow students to follow the traditional "agricultural engineering" track that has been a cornerstone of the department since its inception and for which there are many well-established career opportunities.
2. *New Concentration in Biological Engineering:* In keeping with the national changes in the agricultural and biological engineering profession that have produced major growth in demand for graduates in the biological engineering segment, this concentration integrates biology and engineering to prepare students to be able to practice engineering and provide solutions to problems related to living systems in agriculture, food, environment, and energy.
3. *Modify the subset of the technical core common to all degree-seekers:* An increase from 27 to 28 hours will result from adding ABE 221 (4 hours), to the common subset and removing TAM 251 (3 hours). ABE 221 is regarded as a fundamental ABE course that is to be a requirement for all ABE undergraduate students. TAM 251 will be moved to the Agricultural Engineering Concentration subset of the technical core since its subject matter competency is not necessary for the Biological Engineering Concentration.
4. *Discontinue the current Concentration in Food and Bioprocess Engineering:* With the two new concentrations in place, the existing Food and Bioprocess Engineering Concentration becomes unnecessary as the Biological Engineering Concentration will include similar content as well as offer the flexibility of creating a food and bioprocess engineering specialization within it. In addition, the discontinuance of the Concentration in Food and Bioprocess Engineering will eliminate the issue of this Concentration requiring 132 hours compared to the 128 hours that the existing degree without the concentration requires. The latter is the maximum hours for a degree that the College of Engineering is targeting for all the engineering disciplines.

The proposed revised curriculum will continue to meet the Guidelines for Undergraduate Education and will enhance the educational experiences of the students by providing a career

pathway corresponding to their interest. The revised curriculum will meet all the accreditation requirements of the Accreditation Board for Engineering and Technology (ABET).

#### **BUDGETARY AND STAFF IMPLICATIONS:**


- a. *Additional staff and dollars needed* – The Department strategic plan since 2003 has gradually strengthened expertise in the biological engineering domain and no additional staff or funds are needed to implement the revised curriculum.
- b. *Internal reallocations* - Course sections have capacity to handle modest changes in class size or changes of student interest. Recent faculty hires have been made to provide the biological content in the biological concentration and no additional internal reallocations will be required.
- c. *Effect on course enrollment in other units and explanations of discussions with representatives of those departments* – A preliminary estimate of the number of students in the Biological Engineering concentration that would need to be accommodated in the core courses CHBE 321, CHEM 232, and MCB 150 would be 10-15 per year, which is regarded as small relative to the total number of students that take these courses. The impact of this increase in student enrollment for CHBE 321 was discussed with Dr. Marina Miletic (March 30, 2009), who consulted with Dr. Jon Higdon and they confirmed that accommodating this increase would not be a problem. CHEM 232 and MCB 150 are typically offered both fall and spring semesters thereby helping to spread the enrollment load. An equivalent reduction in enrollment in TAM 251, one of the core courses, will occur because this course is not part of the Biological Engineering Concentration, but does remain in the Agricultural Engineering Concentration. In the future any current reduction in TAM 251 enrollment may be nullified through increased enrollments in the overall Agricultural and Biological Engineering program that are anticipated this fall 2009. It is also expected that initially there will be more students that opt to take the Agricultural Engineering Concentration because of the historical strength and focus in this area, but interest in the Biological Engineering Concentration should grow rapidly as students discover the value of and opportunities in this new curriculum component.
- d. *Impact on the University Library* The changes will have no impact on library resources.
- e. *Impact on computer use, laboratory use, equipment, etc.* – There is sufficient existing capacity in Department resources to implement the proposed changes for its courses. For other Biological Engineering Concentration core courses, the addition of 10-15 students to each course should have a negligible impact. No laboratories are included in TAM 251.

**DESIRED EFFECTIVE DATE:** Fall 2010

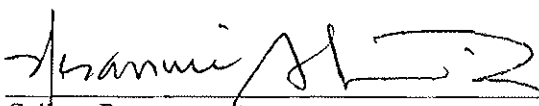
**STATEMENT FOR PROGRAMS OF STUDY CATALOG:** See Appendix A.

**CLEARANCES:**

Signatures:

  
\_\_\_\_\_  
Unit Representative:

10/7/09  
\_\_\_\_\_  
Date:

  
\_\_\_\_\_  
College Representative:

10/23/09  
\_\_\_\_\_  
Date:

\_\_\_\_\_  
Graduate College Representative:

\_\_\_\_\_  
Date:

\_\_\_\_\_  
Provost Representative:

\_\_\_\_\_  
Date:

\_\_\_\_\_  
Educational Policy Committee Representative:

\_\_\_\_\_  
Date:



**APPENDIX A**  
**STATEMENT FOR PROGRAM OF STUDY CATALOG**

(Various Agricultural and Biological Engineering technical elective course lists referenced in this Statement, which will be maintained on the Agricultural and Biological Engineering Department Web site, are found in Appendix B.)

## **Agricultural and Biological Engineering**

Agricultural and Biological Engineering  
Head of Department: K. C. Ting  
Department Office: 338 Agricultural Engineering Sciences Building, 1304 West Pennsylvania Avenue, Urbana, (217) 333-3570

## **Curriculum in Agricultural and Biological Engineering**

abe.illinois.edu  
Fax: (217) 244-0323  
E-mail: [abe@illinois.edu](mailto:abe@illinois.edu)

### **For the Degree of Bachelor of Science in Agricultural and Biological Engineering**

Agricultural and biological engineering is the application of mathematics, physical and biological science, and engineering to agriculture, food systems, energy, the environment, and related biological systems. This ABET-accredited degree program has special emphasis on environmental protection and the biological interface of plants, animals, soils, and microorganisms with the design and performance of environments, machines, mechanisms, processes, and structures.

### **Concentrations**

The agricultural and biological engineering program provides two concentrations: *Agricultural Engineering* and *Biological Engineering*. Each concentration has specific areas of specialization related to career interest.

## **Agricultural Engineering Concentration**

The B.S. Degree in Agricultural and Biological Engineering provides a concentration in *Agricultural Engineering*. This concentration includes the integration of physical and biological sciences as a foundation for engineering applications in agriculture, food systems, energy, the environment, and related biological systems. Students pursuing this concentration are involved in the design of systems for renewable energy, off-road equipment, water quality, and the utilization and protection of soil and water resources. Important design constraints are economics, conservation of materials and energy, safety, and environmental quality. Within this concentration, students are required to select a set of coherent courses that constitutes a specialization in their area of career interest either from the following list or a customized area chosen in consultation with an advisor:

- Renewable Energy Systems
- Off-Road Equipment Engineering
- Soil and Water Resources Engineering

## **Biological Engineering Concentration**

The B.S. Degree in Agricultural and Biological Engineering also provides a concentration in *Biological Engineering*. This concentration integrates biology and engineering to provide solutions to problems related to living systems in agriculture, food, energy, the environment, and related biological systems. Engineered biological systems in these domains vary widely in scale. At the molecular level, nanometer-scale devices consist of a few biomolecules inside individual cells. At the other extreme, regionally-scaled complex ecosystems depend upon multiple species of interacting living organisms. Such systems are becoming increasingly important in areas such as bioenergy, bioprocessing, nanotechnology, biosensing, bio-informatics, and bioenvironment. Within this concentration, students are required to select a set of coherent courses that constitutes a specialization in their area of career interest either from the following list or a customized area chosen in consultation with an advisor:

- Bioenvironmental Engineering
- Ecological Engineering
- Food and Bioprocess Engineering
- Nanoscale Biological Engineering

## **Overview of Curricular Requirements**

The curriculum requires 128 hours for graduation. The curriculum is organized as follows.

## Orientation and Professional Development

These courses introduce the opportunities and resources that your college, department, and curriculum can offer you as you work to achieve your career goals. They also provide the skills to work effectively and successfully in the engineering profession.

Hours	Requirements
1	ABE 100—Agric & Biological Engrg <sup>1</sup>
0	ENG 100—Engineering Orientation <sup>1</sup>
1	Total

1. External transfer students take ENG 300—Engrg Transfer Orientation instead.

## Foundational Mathematics and Science

These courses stress the basic mathematical and scientific principles upon which the engineering discipline is based.

Hours	Requirements
3	CHEM 102—General Chemistry I
1	CHEM 103—General Chemistry Lab I
3	CHEM 104—General Chemistry II
1	CHEM 105—General Chemistry Lab II
4	MATH 221—Calculus I <sup>1</sup>
2	MATH 225—Introductory Matrix Theory
3	MATH 231—Calculus II
4	MATH 241—Calculus III
3	MATH 285—Intro Differential Equations
4	PHYS 211—University Physics: Mechanics
4	PHYS 212—University Physics: Elec & Mag
2	PHYS 213—Univ Physics: Thermal Physics
34	Total

1. MATH 220—Calculus may be substituted, with four of the five credit hours applying toward the degree. MATH 220 is appropriate for students with no background in calculus.

## Agricultural and Biological Engineering Technical Core

These courses stress fundamental concepts and basic laboratory techniques that comprise the common intellectual understanding of agricultural and biological engineering and the background for the technical courses and electives in each student's concentration.

## For Both Concentrations

Hours	Requirements
4	ABE 221—Agric & Biological Engrg I
4	ABE 222—Agric & Biological Engrg II
2	ABE 430—Project Management
4	ABE 469—Industry-Linked Design Project
3	CS 101—Intro Computing: Engrg & Sci
3	ECE 205—Elec & Electronic Circuits
3	GE 101—Engineering Graphics & Design
2	TAM 210—Introduction to Statics <b>or</b> TAM 211—Statics <sup>1</sup>
3	TAM 212—Introductory Dynamics
28	Subtotal for both concentrations. See additional technical core requirements below.

1. The extra hour of credit for this course may be used to help meet free elective requirements.

## For the Agricultural Engineering Concentration

Hours	Requirements
3	CEE 202—Engineering Risk & Uncertainty <b>or</b> IE 300—Analysis of Data <b>or</b> ABE 440—Applied Statistical Methods I <sup>1</sup> <b>or</b> STAT 400—Statistics and Probability I <sup>1</sup>
1	ECE 206—Elec & Electronic Circuits Lab
3	ME 300—Thermodynamics
3	TAM 251—Introductory Solid Mechanics
4	TAM 335—Introductory Fluid Mechanics <b>or</b> CHBE 421—Momentum and Heat Transfer <b>or</b> ME 310—Introductory Gas Dynamics
14	Subtotal
42	Total for the Agricultural Engineering Concentration

1. The extra hour of credit for this course may be used to help meet free elective requirements.

## For the Biological Engineering Concentration

Hours	Requirements
2	ABE 141—Biological Principles in Engrg
3	ABE 341—Heat/Mass Transfer & Momentum
4	CHBE 321—Thermodynamics
3	CHEM 232—Elementary Organic Chemistry I
4	MCB 150—Molec & Cellular Basis of Life
16	Subtotal
44	Total for the Biological Engineering Concentration

## Technical Electives

This elective course work must be completed to fulfill each Concentration. The subjects build upon the agricultural and biological engineering technical core.

### For the Agricultural Engineering Concentration

Hours	Requirements
7	Biological and natural sciences electives chosen from a departmentally approved list of Biological and Natural Sciences Electives – Group A
16	Technical electives chosen in consultation with an advisor. At least 8 hours must be Agricultural and Biological Engineering Technical Electives – Group A, and the remainder approved Other Technical Electives – Group A.
23	Total

### For the Biological Engineering Concentration

Hours	Requirements
6	Biological and natural sciences electives chosen from a departmentally approved list of Biological and Natural Sciences Electives – Group B
15	Technical electives chosen in consultation with an advisor. At least 8 hours must be Agricultural and Biological Engineering Technical Electives – Group B, and the remainder approved Other Technical Electives – Group B.
21	Total

## Social Sciences and Humanities

The social sciences and humanities courses, as approved by the College of Engineering, ensure that students have exposure in breadth and depth to areas of intellectual activity that are essential to the general education of any college graduate.

Hours	Requirements
3	ECON 103—Macroeconomic Principles <sup>1</sup>
15	Electives in social sciences and humanities approved by the College of Engineering and satisfying the campus general education requirements for social sciences and humanities, including cultural studies western and non-western.
18	Total

1. ECON 102 or ACE 100 may be substituted by advisor approval.

## Composition

These courses teach fundamentals of expository writing.

Hours	Requirements
4	RHET 105—Principles of Composition
	Advanced Composition. May be satisfied by completing a course with the Advanced Composition designation in either the social sciences and humanities or the free elective categories.
4	Total

## Free Electives

These unrestricted electives, subject to certain exceptions as noted at the College of Engineering advising Web site, give the student the opportunity to explore any intellectual area of unique interest. This freedom plays a critical role in helping students to define research specialties or to complete minors.

Hours	Requirements
6	Free electives. Additional unrestricted course work, subject to certain exceptions as noted at the College of Engineering advising Web site, so that there are at least 128 credit hours earned toward the degree.

## Suggested Sequence

The schedule that follows for each concentration is illustrative, showing the typical sequence in which courses would be taken by a student with no college course credit already earned and who intends to graduate in four years. Each individual's case may vary, but the position of required named courses is generally indicative of the order in which they should be taken. Refer to the appropriate sequence below for each concentration.

### CONCENTRATION IN AGRICULTURAL ENGINEERING

#### *First year*

HOURS	FIRST SEMESTER
1	ABE 100—Intro Agric & Biological Engrg
3	CHEM 102—General Chemistry I
1	CHEM 103—General Chemistry Lab I

0	ENG 100—Engineering Orientation
3-4	GE 101—Engineering Graphics & Design or RHET 105—Principles of Composition <sup>1</sup>
4	MATH 221—Calculus I <sup>2</sup>
3	Elective in social sciences or humanities <sup>3,4</sup>
15-16	Total

**HOURS SECOND SEMESTER**

3	CHEM 104—General Chemistry II*
1	CHEM 105—General Chemistry Lab II*
2	MATH 225—Introductory Matrix Theory
3	MATH 231—Calculus II
4	PHYS 211—University Physics: Mechanics
4-3	RHET 105—Principles of Composition or GE 101—Engineering Graphics & Design <sup>1</sup>
17-16	Total

\*Biological version recommended.

Second year

**HOURS FIRST SEMESTER**

4	ABE 221—Agric & Biological Engrg I
3	CS 101—Intro to Computing: Engrg & Sci
4	MATH 241—Calculus III
4	PHYS 212—University Physics: Elec & Mag
2	TAM 210—Introduction to Statics or TAM 211—Statics <sup>5</sup>
17	Total

**HOURS SECOND SEMESTER**

4	ABE 222—Agric & Biological Engrg II
3	MATH 285—Intro Differential Equations
2	PHYS 213—Univ Physics: Thermal Physics
3	TAM 212—Introductory Dynamics
4	Biological and natural sciences elective <sup>6a</sup>
16	Total

Third year

**HOURS FIRST SEMESTER**

3	Agricultural engineering technical elective <sup>7a</sup>
3	ECE 205—Elec & Electronic Circuits
1	ECE 206—Elec & Electronic Circuits Lab
3	TAM 251—Introductory Solid Mechanics
3	CEE 202—Engineering Risk & Uncertainty or IE 300—Analysis of Data or ABE 440—Applied Statistical Methods I <sup>5</sup> or STAT 400—Statistics and Probability I <sup>5</sup>

3	Elective in social sciences or humanities <sup>3,4</sup>
16	Total

**HOURS SECOND SEMESTER**

3	Agricultural engineering technical elective <sup>7a</sup>
3	ECON 103—Macroeconomic Principles <sup>3</sup>
3	ME 300—Thermodynamics
4	TAM 335—Introductory Fluid Mechanics or CHBE 421—Momentum and Heat Transfer or ME 310—Introductory Gas Dynamics
3	Elective in social sciences or humanities <sup>3,4</sup>
16	Total

Fourth year

**HOURS FIRST SEMESTER**

2	ABE 430—Project Management
3	Agricultural engineering technical elective <sup>7a</sup>
3	Elective in social sciences or humanities <sup>3,4</sup>
4	Technical elective <sup>7a</sup>
3	Free elective <sup>4</sup>
15	Total

**HOURS SECOND SEMESTER**

4	ABE 469—Industry-Linked Design Project
3	Free elective <sup>4</sup>
3	Technical elective <sup>7a</sup>
3	Biological and natural sciences elective <sup>6a</sup>
3	Elective in social sciences or humanities <sup>3,4</sup>
16	Total

**CONCENTRATION IN BIOLOGICAL ENGINEERING**

First year

**HOURS FIRST SEMESTER**

1	ABE 100—Intro Agric & Biological Engrg
3	CHEM 102—General Chemistry I
1	CHEM 103—General Chemistry Lab I
0	ENG 100—Engineering Orientation
3-4	GE 101—Engineering Graphics & Design or RHET 105—Principles of Composition <sup>1</sup>
4	MATH 221—Calculus I <sup>2</sup>
3	Elective in social sciences or humanities <sup>3,4</sup>
15-16	Total

**HOURS SECOND SEMESTER**

2	ABE 141 — Biological Principles in Engrg
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3	CHEM 104—General Chemistry II*
1	CHEM 105—General Chemistry Lab II*
3	MATH 231—Calculus II
4	PHYS 211—University Physics: Mechanics
4-3	RHET 105—Principles of Composition or GE 101—Engineering Graphics & Design 1
17-16	Total

\*Biological version recommended.

Second year

**HOURS FIRST SEMESTER**

4	ABE 221—Agric & Biological Engrg I
3	CS 101—Intro to Computing: Engrg & Sci
4	MATH 241—Calculus III
4	PHYS 212—University Physics: Elec & Mag
2	TAM 210—Introduction to Statics or TAM 211—Statics <sup>5</sup>
17	Total

**HOURS SECOND SEMESTER**

4	ABE 222—Agric & Biological Engrg II
2	MATH 225—Introductory Matrix Theory
3	MATH 285—Intro Differential Equations
3	CHEM 232—Elementary Organic Chemistry I
2	PHYS 213—Univ Physics: Thermal Physics
3	TAM 212—Introductory Dynamics
17	Total

Third year

**HOURS FIRST SEMESTER**

3	ABE 341—Heat/Mass transfer & Momentum
3	Biological engineering technical elective <sup>7b</sup>
3	ECE 205—Elec & Electronic Circuits
4	MCB 150—Molec & Cellular Basis of Life
3	Elective in social sciences or humanities <sup>3,4</sup>
16	Total

**HOURS SECOND SEMESTER**

3	Biological engineering technical elective <sup>7b</sup>
3	Biological and natural sciences elective <sup>6b</sup>
4	CHBE 321—Thermodynamics
3	ECON 103—Macroeconomic Principles <sup>3</sup>
3	Elective in social sciences or humanities <sup>3,4</sup>
16	Total

Fourth year

**HOURS      FIRST SEMESTER**

2	ABE 430—Project Management
3	Biological engineering technical elective <sup>7b</sup>
3	Elective in social sciences or humanities <sup>3,4</sup>
3	Technical elective <sup>7b</sup>
3	Free elective <sup>4</sup>
14	Total

**HOURS      SECOND SEMESTER**

4	ABE 469—Industry-Linked Design Project
3	Biological and natural sciences elective <sup>6b</sup>
3	Technical elective <sup>7b</sup>
3	Elective in social sciences or humanities <sup>3,4</sup>
3	Free elective <sup>4</sup>
16	Total

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1. RHET 105 may be taken in the first or second semester of the first year as authorized. The alternative is GE 101. Students may take SPCM 111 and 112 in place of RHET 105.

2. MATH 220—Calculus may be substituted with four of the five credit hours applying toward the degree. MATH 220 is appropriate for students with no background in calculus.

3. Each student must satisfy the 18-hour social sciences and humanities requirements of the College of Engineering, including ECON 103 (or either ECON 102 or ACE 100 by permission), and the campus general education requirements for social sciences and humanities.

4. One elective course must satisfy the General Education Advanced Composition requirement.

5. The extra hour of credit for this course may be used to help meet free elective requirements.

6a. Students in the Agricultural Engineering concentration must complete 7 hours and from the approved list of Biological and Natural Sciences Electives – Group A

6b. Students in the Biological Engineering concentration must complete 6 hours from the approved list of Biological and Natural Sciences Electives – Group B.

7a. Students in the Agricultural Engineering concentration must complete 16 hours of technical electives chosen in consultation with an advisor. At least 8 hours must be

from the approved list of Agricultural and Biological Engineering Technical Electives – Group A, and the remainder selected from the approved list of Other Technical Electives – Group A.

7b. Students in the Biological Engineering concentration must complete 15 hours of technical electives chosen in consultation with an advisor. At least 8 hours must be from the approved list of Agricultural and Biological Engineering Technical Electives – Group B, and the remainder selected from the approved list of Other Technical Electives – Group B.

## Appendix B. List of Approved Technical Elective and Biological and Natural Sciences Elective Courses

### 1. Agricultural Engineering Concentration – Group A

#### Biological and Natural Sciences Electives for the Agricultural Engineering Concentration (Group A) – at least 7 hours

Hours	Requirements
4	ANSC 362—Princ of Animal Physiology
3	ANSC 467—Applied Animal Ecology
3	CHEM 232—Elementary Organic Chemistry I
2	CHEM 233—Elementary Organic Chem Lab I
4	CPSC 112—Introduction to Crop Sciences
3	CPSC 270—Applied Entomology
3	CPSC 414—Forage Crops and Pasture Eco
4	GEOL 101—Introductory Physical Geology
3	GEOL 250—Geology for Engineers
3-4	IB 101—Biological Sciences*
4	IB 103—Introduction to Plant Biology*
4	IB 104—Animal Biology*
3	MCB 100—Introductory Microbiology
2	MCB 101—Intro Microbiology Laboratory
3	MCB 103—Intro to Human Physiology
2	MCB 312—Applied Microbiology Methods
3	MCB 434—Food and Industrial Microbiology
4	NRES 201—Introductory Soils

\*Credit given only for IB 101 or 103 or 104

Note: Other courses with a strong biological or biotechnology content may be approved by the Department

**Technical Electives for the Agricultural Engineering Concentration (16 hour minimum) – Group A**

Agricultural and Biological Engineering Technical Electives for the Agricultural Engineering Concentration (Group A) – at least 8 hours

Hours	Requirements
3	ABE 361—Off-Road Machine Design
3	ABE 374—Environ Control for Buildings
1-4	ABE 397—Independent Study
4	ABE 425—Engrg Measurement Systems
3	ABE 436—Renewable Energy Systems
2	ABE 455—Erosion and Sediment Control
3	ABE 456—Land & Water Resources Engrg
2	ABE 457—NPS Pollution Processes
2	ABE 458—NPS Pollution Modeling
3	ABE 459—Drainage and Water Management
3	ABE 463—Electrohydraulic Systems
3	ABE 466—Engineering Off-Road Vehicles
3	ABE 476—Indoor Air Quality Engineering
3	ABE 483—Engrg Properties of Food Matls
3	ABE 488—Bioprocessing Grains for Fuel
3	ABE 489—Corn Milling Process Design
1-4	ABE 497—Independent Study
1-4	ABE 498—Special Topics

Other Technical Electives for the Agricultural Engineering Concentration (Group A) – remainder of 16 hours from list below or any 300 or 400 level engineering course approved by advisor

Hours	Requirements
4	CEE 300—Behavior of Materials
4	CEE 311—Engineering Surveying
3	CEE 330—Environmental Engineering
3	CEE 350—Water resources Engineering
3	CEE 360—Structural Engineering
3	CEE 380—Geotechnical Engineering
2	CEE 450—Surface Hydrology
3	CEE 460—Steel Structures I
3	CEE 461—Reinforced Concrete I
3	CHBE 221—Principles of CHE
4	CHBE 421—Momentum and Heat Transfer
4	CHBE 422—Mass Transfer Operations
4	GE 320—Control Systems

3	GE 330—OR Methods for Profit & Value
4	ME 330—Engineering Materials
3	ME 350—Design for Manufacturability
3	ME 370—Mechanical Design I
3	ME 440—Kinem & Dynamics of Mech Syst
3-4	ME 461—Computer Cntrl of Mech Systems
3	MFGE 310—Manufacturing Systems
3	MFGE 450—Info Mgmt in Manufacturing
2	PHYS 214—Univ Physics: Quantum Physics

## 2. Biological Engineering Concentration – Group B

Biological and Natural Sciences Electives for the Biological Engineering Concentration (Group B) – 6 hour minimum with at least one of the designated courses fulfilling a laboratory requirement

Hours	Requirements
3	CHEM 233—Elementary Organic Chem Lab I*
3	CPSC 261—Biotechnology in Agriculture
3	CPSC 265—Genetic Engineering Lab
3	FSHN 101—Intro Food Science & Nutrition
1	FSHN 274—NonMajors Food Microbiology
3	FSHN 414—Food Chemistry
1	FSHN 416—Food Chemistry Laboratory*
3	FSHN 461—Food Processing I
3	FSHN 462—Food Processing II
3	FSHN 471—Food & Industrial Microbiology
4	GEOG 406—Fluvial Geomorphology
3-4	GEOG 468—Biological Modeling
3-4	GEOG 469—Spatial Ecosystem Modeling
4	IB 151—Organismal & Evolutionary Biol*
4	IB 203—Ecology
3	IB 452—Ecosystem Ecology
1	MCB 151—Molecular & Cellular Laboratory*
3	MCB 250—Molecular Genetics
3	MCB 409—Bioinformatics & Func Genomics
3	MCB 426—Bacterial Pathogenesis
3	MCB 450—Introductory Biochemistry
3	NRES 219—Principles of Ecosystem Mgmt
4	NRES 419—Env and Plant Ecosystems
4	NRES 420—Restoration Ecology
4	NRES 427—Modeling Natural Resources
3	NRES 439—Env and Sustainable Dev
3	NRES 456—Integrative Ecosystem Mgmt

\*Eligible courses meeting laboratory requirement

**Technical Electives for the Biological Engineering Concentration (Group B)**  
 – 15 hour minimum with at least one of the designated courses fulfilling a laboratory requirement

Agricultural and Biological Engineering Technical Electives for the Biological Engineering Concentration (at least 9 hours) – Group B

Hours	Requirements
3	ABE 374—Environ Control for Buildings
1-4	ABE 397—Independent Study
4	ABE 425—Engrg Measurement Systems*
3	ABE 436—Renewable Energy Systems*
3-4	ABE 446—Biological Nanoengineering
2	ABE 455—Erosion and Sediment Control
3	ABE 456—Land & Water Resources Engrg
2	ABE 457—NPS Pollution Processes
2	ABE 458—NPS Pollution Modeling
3	ABE 459—Drainage and Water Management
3	ABE 476—Indoor Air Quality
3	ABE 479—Design of Agr & Bio Structures
3	ABE 483—Engrg Properties of Food Matis*
3	ABE 488—Bioprocessing Grains for Fuel
3	ABE 489—Corn Milling Process Design
1-4	ABE 497—Independent Study
1-4	ABE 498—Special Topics

\*Eligible course meeting laboratory requirement

Other Technical Electives for the Biological Engineering Concentration (Group B)  
 – remainder of 15 hours from list below or any 300 or 400 level engineering course approved by advisor

Hours	Requirements
3	CEE 330—Environmental Engineering
2	CEE 430—Ecological Quality Engineering
3	CEE 431—Biomonitoring
3	CEE 432—Stream Ecology
3	CEE 437—Water Quality Engineering
3	CEE 444—Env Eng Principles, Biological
3	CEE 449—Environmental Engineering Lab*
3	CHBE 221—Principles of CHE
4	CHBE 421—Momentum and Heat Transfer
4	CHBE 422—Mass Transfer Operations
3	CHBE 471—Biochemical Engineering



3	CHBE 472, BIOE 472—Techniques in Biomolecular Eng
3	CS 466—Introduction to Bioinformatics
1	ECE 206— Elec & Electronic Circuits Lab*
3	ECE 416—Biosensors
3 or 4	ECE 475, BIOE 475—Modeling of Bio-Systems
3	ECE 480, BIOE 480—Magnetic Resonance Imaging
3	MSE 470—Design and Use of Biomaterials
3	MSE 472, BIOE 473—Biomaterials Laboratory*
3	MSE 498—MatSE for Sustainability
4	TAM 461, BIOE 461—Cellular Biomechanics

\*Eligible courses meeting laboratory requirement

**Draft Minutes**  
**College of Engineering Executive Committee (EC) Meeting**  
**Tuesday, 1:00 p.m., October 20, 2009**  
**301 Engineering Hall**

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**Present:**

N. Cheng (MNTL)	P. Goldbart (Phys)	D. Jones (ECE)
V. Coverstone (Admin)	B. Heuser (NPRE)	D. Sarwate (CSL)*
B. Cunningham (BioE)	P. Kalita (ABE)	R.S. Sreenivas (IESE)
G. Dullerud (MechSE)	S. Kamin (CS)	C. Tucker (Admin)

**Absent:**

I. Adesida (Admin)	M. Rood (CEE)	M. Wong (CSL)
B. Conway (AE)	J. Weaver (MatSE)	H. Zhao (ChBE)

\* = alternate

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1. The meeting was called to order at 1:05.
2. Approval of the Draft Minutes from Sept. 29, 2009.  
The minutes were approved unanimously, pending revisions.

3. New/Old Business

a. Subcommittee replacement members to "Revision to B.S. Degree in IESE"

Previously chosen members were: Sheldon Jacobson (CS, Chair), Barb Minsker (CEE), Tolga Tezkan (IESE), Prashant Mehta (MechSE), Kevin Pitts (Phys). Jacobson and Minsker were unable to serve. It was agreed that a four-person committee would suffice. Riyadurgam Srikant (ECE) was chosen as the chair. Thus, the *ad hoc* committee is now: Riyadurgam Srikant (ECE), Tolga Tezkan (IESE), Prashant Mehta (MechSE), Kevin Pitts (Phys).

4. Course Outlines/Proposals/Reports

a. New/Revised Course Outlines and Program Proposals

b. Subcommittee Reports

– B.S. in ABE *ad hoc* committee report

The committee voted unanimously to accept the report. There was some discussion about an issue raised in the committee's report, which is the way in which the various "biology + engineering" programs – ABE, BioE, and ChBE – were differentiating themselves. Chuck Tucker stated that Dean Ade was taking action on this issue, and had seen this committee's report (among other things).

– BIOE 301 *ad hoc* committee report

*The committee voted unanimously to accept the report.*

– ENG 460 and 466 *ad hoc* committee report

*The committee voted unanimously (with one abstention) to accept the report.*

– ME 483 *ad hoc* committee report

*The committee voted unanimously to accept the report.* There was some discussion about overlap between this course, Mechanobiology, and other courses, in particular, BIOE 301, Introductory Biomechanics, just approved. However, despite the similarity of names, the topics and intended

audiences are quite different. There was also discussion about the possible cross-listing of ME 483 with BIOE 483, which was requested by both departments and endorsed by the ad hoc committee. The EC had previously ruled that the cross-list request did not meet the cross-listing guidelines, and the position was reaffirmed. It was left open whether, in the future, ad hoc committees should be asked to consider cross-list requests (in which case they should be made aware of the guidelines).

– M.S. in AE *ad hoc* committee report  
*The committee voted unanimously to accept the report.*

– PHYS 221 and 222 *ad hoc* committee report  
*The committee voted unanimously to accept the report.*

– Revision to Undergrad Physics Curriculum *ad hoc* committee report  
*The committee voted unanimously to accept the report.* It was noted that the cover letter from Chuck Tucker had a minor typo in the titles of the proposed new courses; this will be corrected before forwarding to the next administrative level.

– Revision to Undergrad Minor in Physics *ad hoc* committee report  
Dilip Sarwate asked whether there are rules concerning the numbers of hours allowed in a minor, and it was determined that the campus guidelines call for minors to have 16-21 hours. At 21-25 hours, the Physics minor would push that limit. *The item was tabled until the next meeting.* Chuck Tucker will consult with the provost's office (Kristi Kuntz) to determine whether this proposal is likely to be rejected, and Paul Goldbart will give Gary Gladding a heads-up about this issue.

5. Additional items

–The letter from Becky Osgood thanking the EC for its gift on the occasion of her retirement was read by Sam Kamin.

– Brent Heuser told the committee that he had done some research on the question of the 128-hour limit on engineering degrees. He found that, when taken in comparison with degrees offered at our peer institutions, 128 hours is a very reasonable and defensible number, quite in line with our peers. asdf – asdf

5. The meeting adjourned at 2:00.

The minutes have not yet been approved.  
Respectfully submitted,

R.S. Sreenivas, Acting Secretary

cc: Robin Dennis  
Michael Pleck

**From:** Anne Baranger [mailto:[baranger@illinois.edu](mailto:baranger@illinois.edu)]

**Sent:** Saturday, January 30, 2010 4:01 PM

**To:** Hansen, Alan

**Subject:** RE: Letter of Support: ABE Curriculum

Dear Professor Hansen,

The Chemistry Department is happy to support the Agriculturist and Biological Engineering concentration. We understand that this concentration is expected to add approximately 20 students to Chem 232. This number of students will be easily accommodated in Chem 232, and we do not foresee any problems with students in this new concentration taking chemistry courses. I have consulted with Steve Zimmerman, who is Head of our department, and he agrees with this decision. Please let me know if you need anything else from us.

Best,

Anne Baranger

Chair, Curriculum Committee, Department of Chemistry

-----Original Message-----

From: [jhigdon@illinois.edu](mailto:jhigdon@illinois.edu) [mailto:[jhigdon@illinois.edu](mailto:jhigdon@illinois.edu)]

Sent: Wednesday, January 27, 2010 2:36 PM

To: Hansen, Alan

Subject: Re: FW: EP 10.19, Proposal to Establish two Concentrations....

Alan: Chemical Engineering supports your proposed program. We are able to accomodate a number of your students in CHBE 421 and approximately 20 students per year inThermodynamics CHBE 321.

Good luck with your program,

Jonathan J. L. Higdon  
Co-Chair, Courses and Curricula  
Chemical and Biomolecular Engineering

----- Original message -----

>Date: Wed, 27 Jan 2010 11:08:48 -0600

>From: "Hansen, Alan" <[achansen@illinois.edu](mailto:achansen@illinois.edu)>

>Subject: FW: EP 10.19, Proposal to Establish two Concentrations....

>To: "[jhigdon@illinois.edu](mailto:jhigdon@illinois.edu)" <[jhigdon@illinois.edu](mailto:jhigdon@illinois.edu)>

>Cc: "[marina@illinois.edu](mailto:marina@illinois.edu)" <[marina@illinois.edu](mailto:marina@illinois.edu)>, "Pleck, Michael H" <[mhpleck@ad.uiuc.edu](mailto:mhpleck@ad.uiuc.edu)>

>

> Dear Professor Higdon:

>

- > You will see below that our department submitted a
- > proposal to create two new concentrations and
- > discontinue an existing concentration, and this
- > proposal is about to be submitted to the Senate.
- > However, the Senate Ed Policy Committee requested
- > that letters be obtained from specific departments
- > as soon as possible concerning required courses that
- > have been specified in the revised curriculum to
- > ensure that an increased enrollment can be
- > accommodated. I have attached a copy of the
- > Statement for the Programs of Study that details the
- > courses involved. You will see that CHBE 321 and
- > CHBE 421 are listed for both the Agricultural
- > Engineering and Biological Engineering
- > concentrations. In the case of the Agricultural
- > Engineering concentration, CHBE 421 is listed as an
- > alternative to TAM 335 and ME 310 and this
- > specification is the same as for the present
- > curriculum. In the Biological Engineering
- > concentration CHBE 321 is specifically listed as a

> required course. We expect that a steady state  
> enrolment for this course from ABE would be  
> approximately 20 students, given this latter  
> requirement.

>  
>  
>

> An email in response to this request would be much  
> appreciated. If this is in order then I can forward  
> your response directly to Professor Krassa in time  
> for it to be included with the proposal documents  
> for review by the Senate and the Trustees.

>  
>  
>

> Thank you for taking care of this request. Please  
> feel free to contact me if you have any questions.

>  
>  
>

> Regards,

>  
>  
>

> Alan Hansen  
> Professor  
> Department of Agricultural and Biological Engineering  
> University of Illinois  
> 1304 W. Pennsylvania Ave.  
> Urbana, IL 61801  
> Phone: 217-333-2969  
> Fax: 217-244-0323  
>

UNIVERSITY OF ILLINOIS  
AT URBANA-CHAMPAIGN

School of Molecular and Cellular Biology  
393 Morrill Hall  
505 South Goodwin Avenue  
Urbana, IL 61801



15 March 2010

Professor Alan Hansen  
Department of Agricultural and Biological Engineering  
University of Illinois  
1304 W. Pennsylvania Ave.  
Urbana, IL 61801

Dear Professor Hansen,

On behalf of the School of Molecular & Cellular Biology, I write to confirm our agreement to provide up to twenty (20) seats per academic year in MCB 150 for your Agricultural and Biological Engineering (ABE) undergraduate students. We understand that this will help facilitate your proposed new curriculum in ABE and expect to provide these seats each academic year starting Fall 2010.

In order to help us support the delivery of this instruction, Dean Best from the College of LAS has agreed to provide funding to MCB in the amount of \$250 per ABE student enrolled in MCB 150. If the numbers rise substantially above 20 per year, or if a new budget model is implemented by campus, the College of LAS reserves the right to review this agreement with MCB and ABE. The School of MCB reserves the right to request that this agreement be revised should the numbers rise above 20 to a point at which additional infrastructure would need to be added to the course.

We look forward to welcoming your students into our course.

Sincerely,

A handwritten signature in black ink that reads "Melissa Michael". The signature is fluid and cursive.

Melissa Michael  
Assistant Director for Undergraduate Instruction  
School of Molecular and Cellular Biology  
mmichae@illinois.edu