

April 14, 2008

To: The Engineering Faculty  
 From: The Department of Agricultural and Biological Engineering  
 Date: April 14, 2008 (Revised October 3, 2008)  
 Subject: Renaming current BS Agricultural and Biological Engineering degree and creation of a new BS degree

The faculty of the Department of Agricultural and Biological Engineering (ABE) has approved the renaming of our current BS degree (Agricultural and Biological Engineering) to Agricultural Engineering and the creation of a new BS engineering degree (Biological Engineering). This action is now submitted to the Engineering Faculty with a recommendation for approval.

### Rationale and Background

Engineering graduates from ABE receive a B.S. degree in Agricultural and Biological Engineering through either the Agricultural and Natural Resources Engineering (ANRE) program or the Biological and Food Process Engineering (BFPE) program. Each of these programs were reviewed by ABET in October, 2007. Each of these programs received a weakness regarding Criterion 8 Program Criteria. The ANRE program did not meet the "biological" criteria and the BFPE program did not meet the "agricultural" criteria.

In 2006, ABET established a new biological criteria and redefined the agricultural criteria. Leading up to the Purdue ABE review, conversations with ABET staff left us confident that our existing ANRE program would be reviewed using the agricultural criteria and the BFPE program would be reviewed using the biological criteria. However, following the submission of our self study report, ABET determined that programs that have compound degree names must meet all criteria in the degree name in addition to criteria from the program name. As a result, the ABET review of Purdue ABE programs identified a weakness in each program. Namely, we were unable to meet the agricultural criteria with the BFPE program and we were unable to meet the biological criteria with the ANRE program.

Splitting of these distinct programs into separate degrees overcomes the ABET weakness by using degree names that require only one criteria be met for each degree (B.S. Agricultural Engineering and B.S. Biological Engineering). ABE faculty considered several alternatives before proposing the creation of a new degree (Biological Engineering) and renaming of the current degree (Agricultural Engineering). The options considered included:

- Change the current degree (Agricultural and Biological Engineering) to Biological Engineering. This would require a fairly significant change in the ANRE plan of study to meet the ABET biological criteria. This change would require removal of content from the plan of study that provides a competitive edge for our students in this program. Maintaining "agriculture" in the degree name is important to many employers, alumni, students and faculty. This option was rejected.
- Modify each plan of study to meet both criteria (agricultural and biological). Significant changes would be required in program objectives, outcomes and each plan of study. These changes would result in broader and less focused programs which are not desirable. This option was rejected.

We anticipate no change in curricula or courses. Pending approval, the attached plans of study for programs would become plans of study for separate degrees.

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

Bernie Engel  
 Head  
 Department of Agricultural and Biological Engineering

ECC Minutes #11

Date 11-12-08

Chairman ECC Roy Cipia



# Biological Engineering Plan of Study

(Proposed)

(Credit Hours Required for Graduation: 137)

## **Freshman Year** (ABE 120, Introduction to Ag & Biological Engineering, is recommended for the Freshman year.)

First Semester	Second Semester
1 AGR 101 Freshman Engineering Lectures	4 CHM 116 General Chemistry II
OR ENGR 100 Freshman Engineering Lectures	3 COM 114 Fundamentals of Speech Communications
4 CHM 115 General Chemistry I	4 MA 166 Plane Analytic Geometry and Calculus II
4 ENGL 106 English Composition I	4 PHYS 172 Modern Mechanics
3 ENGR 126 Engineering Problem Solving and Computer Tools	3 Humanities/Social Science Elective
4 MA 165 Plane Analytic Geometry and Calculus I	
16	18

## **Sophomore Year**

Third Semester	Fourth Semester
3 ABE 201 Thermodynamics of Biological Systems I	3 ABE 202 Thermodynamics of Biological Systems II
4 MA 261 Multivariate Calculus	3 BCHM 221 Analytical Biochemistry OR F&N 205 Food Science
4 CHM 257 Organic Chemistry	3 MA 265 Linear Algebra
3 PHYS 241 Electricity and Optics	3 MA 266 Ordinary Differential Equations
3 General Education elective **	3 Engineering Technical Elective (IE 343 recommended)
1 ABE 290 Sophomore Seminar	3 General Education Elective**
18	18

## **Junior Year**

Fifth Semester	Sixth Semester
3 ABE 303 App of Phys Chemistry to Biol Processes	4 BIOL 221 Microbiology
3 ABE 301 Modeling & Computation Tools in Biological Engineering	3 ABE 370 Biological/Microbial Kinetics and Reaction Engineering
3 CHE 377 Momentum Transfer	3 CHE 378 Heat and Mass Transfer
3 BIOL 230 Biology of the Living Cell	4 ABE 454 Transport Processes in Biological and Food Process Systems
1 BIOL 295F Quantitative Biology of the Living Cell	3 Engineering Elective (CHE 320 recommended)
3 General Education Elective **	
16	17

## **Senior Year**

Seventh Semester	Eighth Semester
1 ABE 490 Professional Practice in Agricultural and Biological Engineering	3 ABE 580 Process Engineering of Renewable Resources
4 ABE 555 Biological and Food Processing Unit Operations	4 ABE 556 Biological and Food Process Design
4 Biological or Food Science Elective ††	3 ABE 460 Sensors and Process Controls
3 Engineering Elective ††	3 General Education Elective**
6 General Education Elective**	3 Biological or Food Science Elective ††
18	16

\*\* Eighteen credit hours of general education electives must be chosen in accordance with the general education document (available in the Student Academic Center, ABE 201). Of the 18 credit hours, 3 must be Economics (ECON 251 or 252), and 3 must be an additional Communication elective.

†† Restricted elective. See list of approved courses in the ABE Student Handbook.

Selectives: FS 361, FS 362, FS 453, FS 467, F&N 315, F&N 534



# Agricultural Engineering Plan of Study (Proposed)

(Credit Hours Required for Graduation: 131)

**Freshman Year** (ABE 120, Introduction to Ag & Biological Engineering, is recommended for the Freshman year)

**First Semester**

- 1 AGR 101 Introduction to the School of Agriculture and Purdue University
- OR ENGR 100 Freshman Engineering Lectures
- 4 CHM 115 General Chemistry
- 4 ENGL 106 English Composition I
- 3 ENGR 126 Engineering Problem Solving and Computer Tools
- 4 MA 165 Plane Analytic Geometry and Calculus I

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**Second Semester**

- 4 Science Selective (CHM 116 for ENRE option; CHM 116 or CS 159 for MSE (3) option
- OR CS 159 Programming Applications for Engineering**
- (Students specializing in Machinery Systems Engineering only)**
- 3 COM 114 Fundamentals of Speech Communications
- 4 MA 166 Plane Analytic Geometry and Calculus II
- 4 PHYS 172 Modern Mechanics
- 3 Humanities Elective

18 (17)

**Sophomore Year**

**Third Semester**

- 3 ABE 205 Engineering Computations for Biological Systems
- 1 ABE 290 Sophomore Seminar
- 4 MA 261 Multivariate Calculus
- 4 Biological Sciences Elective
- 3 ME 270 Basic Mechanics I
- 3 PHYS 241 Electricity and Optics

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**Fourth Semester**

- 3 ABE 210 Biological Applications of Material and Energy Balances
- 3 NUCL 273 Mechanics of Materials
- 4 MA 262 Linear Algebra and Differential Equations
- 3 ME 274 Basic Mechanics II
- 3 Social Sciences Elective\*\*

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**Junior Year**

**Fifth Semester**

- 3 ABE 305 Physical Properties of Biological Materials
- 4 ABE 325 Soil and Water Resource Engineering
- 3 AGRY 255 Soil Science
- 4 CE 340 Hydraulics (3cr) AND CE 343 Elementary Hydraulics Lab (1cr)
- OR ME 309 Fluid Mechanics (4 cr)
- 3 Free Elective

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**Sixth Semester**

- 3 ABE 330 Design of Machine Components
- 4 Biological Sciences Elective
- 3 ECE 201 Linear Circuit Analysis I
- 3 Economics Elective\*\*
- 3 Free Elective

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**Senior Year**

**Seventh Semester**

- 3 ABE 435 Hydraulic Control Systems for Mobile Equipment
- 3 ABE 450 Finite Element Method in Design and Optimization
- 1 ABE 490 Professional Practice in Agricultural & Biological Engineering
- 3 Engineering Technical Elective
- 3 Agricultural Elective
- 3 Written and Oral Communication Elective\*\*

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**Eighth Semester**

- 4 ABE 485 Agricultural Engineering Design
- 3 Engineering Technical Elective
- 3 Social Sciences Elective\*\*
- 3 Humanities Elective\*\*
- 1 Free Elective (2 hours for those taking CS 159)

14 (15)

\*\* A total of eighteen credit hours of general education electives must be taken in accordance with the requirements of the College of Agriculture and Engineering.

Six credits within the plan of study must meet College of Agriculture International Understanding requirements.

