Engineering Faculty Document No. 31-06
March 23, 2007

TO: Engineering Faculty
FROM: The Faculty of Agricultural and Biological Engineering
RE: Curriculum Change for the B.S. Degrees in Agricultural & Biological Engineering

The faculty of the Department of Agricultural and Biological Engineering has approved the curriculum for the B.S. degrees in Agricultural & Biological Engineering effective for students entering the School after the Spring Semester 2007. This action is now submitted to the Engineering Faculty with a recommendation for approval.

Revised Plans of Study for the Agricultural and Biological Engineering Environmental & Natural Resources and Machinery Systems Engineering options (the first POS) and for the Biological and Food Process Engineering (BFPE) option are attached. New courses or changes in required courses are shown in bold.

The proposed changes during the first year are in accord with recent changes to the First Year Engineering (FYE) curriculum. As of the fall semester of 2006:

1. ENGR 106, a 2 credit hour course, was replaced with ENGR 126, a 3 credit hour course that places a greater emphasis on teaching computing concepts using MATLAB as the vehicle. Engineering departments were given the option of requiring a second chemistry course or a 3 hour computer science course, or both courses, during the second semester of the first year. When FYE proposed these changes, they noted that national trends across engineering programs include first-year engineering curricula with a single semester of chemistry.

2. In addition, the Department of Physics recently began offering PHYS 172 Modern Mechanics and that has replaced PHYS 152 as the preferred introductory physics course for engineering students.

3. During the fall of 2006 the Computer Science Department began offering CS 159, a course that includes both C programming and MATLAB programming. This course is a preferred alternative to the C programming course listed in the current plan of study, CS 156, (2 credit hours) or the alternative CS 158 (3 credit hours).

4. The ABE faculty would like to require students in the Biological and Food Processing (BFPE) and Environmental Resources (ENRE) options to take CHM 116. However, they are willing to allow students in the Machinery Systems Engineering (MSE) option to take either CHM 116 or CS 159. Either a second semester of chemistry or a computer science course would benefit the MSE students and the two courses are considered to be of equal importance.

5. A general elective was added to both the ABE and BFPE plans of study during the second semester of the first year to make ABE's first year engineering plan of study consistent with those of other engineering departments.

6. The second curriculum change involves the sophomore (ABE 290) and senior (ABE 490) seminars. At the present time, only ABE 490 is required for all students. However, the content of ABE 290 was recently updated to include instruction in ethics, globalization, preparation for summer internships, and similar topics. Instruction in these areas is considered important by the Department faculty and also by reviewers during periodic accreditation visits by representatives of ABET, Inc., the international organization that accredits engineering programs. Therefore, the ABE faculty proposes that students be required to take both ABE 290 and ABE 490.

7. The final change involves CE 273 Mechanics of Materials, which is no longer offered. It is being replaced in the ABE Plan of Study by NU 273 Mechanics of Materials. Responsibility for providing a mechanics of materials course was recently transferred from Civil Engineering to Nuclear Engineering.

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Professor and Head
Agricultural and Biological Engineering Department

Agricultural and Biological Engineering [Current] Plan of Study
(Students entering Fall 2001 and after)

(Credit Hours Required for Graduation: 131)

Freshman Year (ABE 120, Introduction to Ag & Biological Engineering, is recommended)

First Semester				Second Semester			
1	AGR	101	Introduction to the School of Agriculture and Purdue University	4	CHM	116	General Chemistry
	OR	ENGR	100 First Year Engineering Lectures	3	COM	114	Fundamentals of Speech Communications
4	CHM	115	General Chemistry	4	MA	166	Plane Analytic Geometry and Calculus II
4	ENGL	106	English Composition I	4	PHYS	152	Mechanics
2	ENGR	106	Introduction to Computer Tools for Engineers	2	CS	156	C Programming for Engineers
4	MA	165	Plane Analytic Geometry and Calculus I				
15				17			

Sophomore Year

Third Semester				**Fourth Semester**			
3	ABE	205	Engineering Computations for Biological Systems	3	ABE	210	Biological Applications of Material and Energy Balances
(1)	ABE	290	Sophomore Seminar (recommended)	3	CE	273	Mechanics of Materials
4	MA	261	Multivariate Calculus	4	MA	262	Linear Algebra and Differential Equations
4	Biological Sciences Elective			3	ME	274	Basic Mechanics II
3	ME	270	Basic Mechanics I	3	Social Sciences Elective**		
3	PHYS	241	Electricity and Optics				
17(18)				16			

Junior Year

Fifth Semester				Sixth Semester			
3	ABE	305	Physical Properties of Biological Materials	3	ABE	330	Design of Machine Components
4	ABE	325	Soil and Water Resource Engineering	4	Biological Sciences Elective		
3	AGRY	255	Soil Science	3	ECE	201	Linear Circuit Analysis I
4	CE 340 Hydraulics (3cr) AND CE 343 Elementary Hydraulics Lab (1cr)			3	Economics Elective**		
	OR ME 309 Fluid Mechanics (4 cr)			3	Free Elective		
3	Humanities Elective**						
17				16			

Senior Year

Seventh Semester				Eighth Semester			
3	ABE	435	Hydraulic Control Systems for Mobile Equipment	4	ABE	485	Agricultural Engineering Design
3	ABE	450	Finite Element Method in Design and Optimization	3	Engineering Technical Elective		
1	ABE	490	Professional Practice in Agricultural & Biological Engineering	3	Social Sciences Elective**		
3	Engineering Technical Elective			3	Humanities Elective**		
3	Agricultural Elective			4	Free Elective		
3	Written and Oral Communication Elective**						
16				17			

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

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

Agricultural and Biological Engineering [Proposed] Plan of Study

(Effective January 2007 – changes from 2001 POS shown in bold type)

(Credit Hours Required for Graduation: 131)

Freshman Year (First Year Engineering)

First Semester				Second Semester			
1	AGR 101 Introduction to the School of Agriculture and Purdue University			4	Science Selective (CHM 116 for ENRE option; CHM 116 or CS 159		
	OR ENGR 100 First Year Engineering Lectures			(3)	for MSE option)		
4	CHM	115	General Chemistry	3	COM	114	Fundamentals of Speech Communications
4	ENGL	106	English Composition I	4	MA	166	Plane Analytic Geometry and Calculus II
3	ENGR	126	Engineering Problem Solving and Computer Tools	4	PHYS	172	Modern Mechanics
4	MA	165	Plane Analytic Geometry and Calculus I	3			Humanities Elective
16				18 (17))			

Sophomore Year

Third Semester				**Fourth Semester**			
3	ABE	205	Engineering Computations for Biological Systems	3	ABE	210	Biological Applications of Material and Energy Balances
1	ABE	290	Sophomore Seminar	3	NU	273	Mechanics of Materials
4	MA	261	Multivariate Calculus	4	MA	262	Linear Algebra and Differential Equations
4	Biological Sciences Elective			3	ME	274	Basic Mechanics II
3	ME	270	Basic Mechanics I	3	Social Sciences Elective**		
3	PHYS	241	Electricity and Optics				
18				16			

Junior Year

Fifth Semester				Sixth Semester			
3	ABE	305	Physical Properties of Biological Materials	3	ABE	330	Design of Machine Components
4	ABE	325	Soil and Water Resource Engineering	4	Biological Sciences Elective		
3	AGRY	255	Soil Science	3	ECE	201	Linear Circuit Analysis I
4	CE 340 Hydraulics (3cr) AND CE 343 Elementary Hydraulics Lab (1cr)			3	Economics Elective**		
	OR ME 309 Fluid Mechanics (4 cr)			3	Free Elective		
3	Free Elective						
17				16			

Senior Year

Seventh Semester				Eighth Semester			
3	ABE	435	Hydraulic Control Systems for Mobile Equipment	4	ABE	485	Agricultural Engineering Design
3	ABE	450	Finite Element Method in Design and Optimization	3	Engineering Technical Elective		
1	ABE	490	Professional Practice in Agricultural & Biological Engineering	3	Social Sciences Elective**		
3	Engineering Technical Elective			3	Humanities Elective**		
3	Agricultural Elective			1	Free Elective (2 hours for those taking CS 159)		
3	Written and Oral Communication Elective**						
16				14 (15)			

** A total of eighteen credit hours of general education electives must be taken in accordance with the requirements of the Colleges of Agriculture and Engineering. Six credits within the plan of study must meet School of Agriculture International Understanding requirements.

Biological and Food Process Engineering [Current] Plan of Study

(Students entering Fall 2001 and after)

(Credit Hours Required for Graduation: 133)

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

First Semester				Second Semester			
1	AGR	101	Introduction to the School of Agriculture and Purdue Univ.	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	152	Mechanics
2	ENGR	106	Introduction to Computer Tools for Engineers	2	CS	156	C Programming for Engineers
4	MA	165	Plane Analytic Geometry and Calculus I		OR	CS 152	Fortran
15				17			

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 Chemistryl	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
				3			General Education Elective**
17				18			

Junior Year

Fifth Semester				Sixth Semester			
3	ABE	303	Applications of Phys. Chemistry to Biological 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	295E	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			General Education Elective **	3			Engineering 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	556	Biological and Food Process Design
4	ABE	555	Biological and Food Processing Unit Operations	3	ABE	460	Sensors and Process Controls
3			Biological or Food Science Elective ††	3			General Education Elective**
3			Engineering Elective††	3			Biological or Food Science Elective††
6			General Education Elective**				
17				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.*

Biological and Food Process Engineering [Proposed] Plan of Study

(Effective January 2007 – changes from 2001 POS shown in bold type)

(Credit Hours Required for Graduation: 133**)**

Freshman Year(First Year Engineering)

First Semester				Second Semester			
1	AGR 101 Introduction to the School of Agriculture and Purdue Univ.			4	CHM	116	General Chemistry II
	OR ENGR 100 First Year 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			**General Education 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
1	ABE	290	Sophomore Seminar	3			Engineering Technical Elective
				3			General Education Elective**
15				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	295E	Biology of the Living Cell	4	ABE	454	Transport Processes in Biological and Food
1	BIOL	295F	Quantitative Biology of the Living Cell				Process Systems
3			**General Education Elective	3			Engineering Elective
16				17			

Senior Year

Seventh Semester				Eighth Semester			
1	ABE	490	Professional Practice in Agric. and Biological Engr. (recommended)	3	ABE	580	Process Engineering of Renewable Resources
				4	ABE	556	Biological and Food Process Design
4	ABE	555	Biological and Food Processing Unit Operations	3	ABE	460	Sensors and Process Controls
3	ABE	490	Biological or Food Science Elective ††	3			General Education Elective**
3			Engineering Elective††	3			Biological or Food Science Elective††
6			General Education Elective**				
17				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.*

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