

**CURRICULUM IN AGRICULTURAL & BIOLOGICAL ENGINEERING**

**Fall 2012**

UNIVERSITY of ILLINOIS at URBANA-CHAMPAIGN

For the degree of Bachelor of Science in Agricultural and Biological Engineering

**AGRICULTURAL ENGINEERING CONCENTRATION**

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. The ABET-accredited B.S. Degree in Agricultural and Biological Engineering provides a concentration in **Agricultural Engineering** that includes the integration of physical and biological sciences as a foundation for engineering application 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.

**FIRST YEAR**

<b>First Semester</b>	<b>Hours</b>	<b>Second Semester</b>	<b>Hours</b>
ABE 100 - Intro Agric & Biological Engrg .....	1	ABE 141 – ABE Principles: Biological .....	2
CHEM 102 - General Chemistry I.....	3	CHEM 104 - General Chemistry II .....	3
CHEM 103 - General Chemistry Lab I.....	1	CHEM 105 - General Chemistry Lab II .....	1
ENG 100 - Engineering Orientation.....	0	MATH 231 - Calculus II.....	3
GE 101 - Engineering Graphics & Design or		PHYS 211 – University Physics: Mechanics .....	4
RHET 105 - Principles of Composition <sup>1</sup> .....	3-4	RHET 105 - Principles of Composition or	
MATH 221 - Calculus I <sup>2</sup> .....	4	GE 101 - Engineering Graphics & Design <sup>1</sup> .....	4-3
Liberal education elective <sup>3</sup> .....	3	Total.....	17-16
Total .....	15-16	*Biological Version Recommended	

**SECOND YEAR**

ABE 223 – ABE Principles: Machine Syst.....	2	ABE 225 – ABE Principles: Bioenvironment .....	2
ABE 224 – ABE Principles: Soil & Water .....	2	ABE 226 – ABE Principles: Bioprocessing .....	2
CS 101 - Intro Computing: Engrg & Sci .....	3	MATH 225 – Introductory Matrix Theory.....	2
MATH 241 - Calculus III .....	4	MATH 285 - Intro Differential Equations.....	3
PHYS 212 - University Physics: Elec & Mag .....	4	PHYS 213 - University Physics: Thermal Physics.....	2
TAM 210 - Introduction to Statics or		TAM 212 - Introductory Dynamics.....	3
TAM 211 - Statics <sup>5</sup> .....	2	Biological and natural sciences elective <sup>6</sup> .....	3
Total .....	17	Total .....	17

**THIRD YEAR**

ABE 440 - Applied Statistical Methods I <sup>5</sup> , CEE 202,		ECON 103 - Macroeconomic Principles <sup>3</sup> .....	3
STAT 400 <sup>5</sup> , or IE 300.....	3	ME 300 - Thermodynamics or CHBE 321 – Thermodynamics <sup>5</sup> .....	3
ECE 205 - Elec and Electronic Circuits.....	3	TAM 335 - Introductory Fluid Mechanics or CHBE 421	
ECE 206 - Elec and Electronic Circuits Lab .....	1	or ME 310 .....	4
TAM 251 - Introductory Solid Mechanics.....	3	Agricultural & biological engineering technical elective <sup>7</sup> .....	3
Agricultural & biological engineering technical elective <sup>7</sup> .....	3	Liberal education elective <sup>3</sup> .....	3
Liberal education elective <sup>3</sup> .....	3	Total .....	16
Total .....	16		

**FOURTH YEAR**

ABE 430 - Project Management.....	2	ABE 469 – Industry-Linked Design Project <sup>4</sup> .....	4
Agricultural & biological engineering technical elective <sup>7</sup> .....	3	Biological and natural sciences elective <sup>6</sup> .....	3
Technical elective <sup>7</sup> .....	3	Technical elective <sup>7</sup> .....	3
Liberal education elective <sup>3</sup> .....	3	Liberal education elective <sup>3</sup> .....	3
Free elective .....	3	Free elective .....	3
Total .....	14	Total .....	16

**TOTAL HOURS FOR DEGREE . . . 128**

<sup>1</sup> 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.

<sup>2</sup> 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.

<sup>3</sup> Students must satisfy the 18-hour liberal education 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.

<sup>4</sup> ABE 469 satisfies the general education advanced composition requirement.

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

<sup>6</sup> Students must complete at least 6 hours from the Biological and Natural Sciences approved list.

<sup>7</sup> Students must complete 15 hours of technical electives; at least 8 hours must be from the approved list of ABE technical electives, and the remainder selected from the approved list of Other Technical Electives.

**Biological and Natural Sciences (6 hours)**

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

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

Other courses with a strong biological or biotech content may be approved by chief advisor.

**Technical Electives for Agricultural Engineering Concentration (15 hours)**

**Agricultural and Biological Engineering Technical Electives; at least 8 hours from:**

ABE 341	Transport Processes in ABE .....	3	ABE 459	Drainage and Water Management .....	3-4
ABE 361	Off-Road Machine Design .....	3	ABE 463	Electrohydraulic Systems .....	3
ABE 374	Environ Control for Buildings .....	3	ABE 466	Engineering Off-road Vehicles .....	3
ABE 397*	Independent Study .....	1-4	ABE 476	Indoor Air Quality Engineering .....	4
ABE 398*	Special Topics .....	1-3	ABE 482	Package Engineering .....	3
ABE 420	Kinem & Dynamics of Mech Syst .....	3	ABE 483	Engrg Properties of Food Matls .....	3
ABE 425 <sup>#</sup>	Engrg Measurement Systems .....	4	ABE 485	Food & Process Engrg Design .....	2
ABE 436	Renewable Energy Systems .....	3-4	ABE 487	Grain Drying and Conditioning .....	3
ABE 446	Biological Nanoengineering .....	3	ABE 488	Bioprocessing Biomass for Fuels .....	3
ABE 455	Erosion and Sediment Control .....	2	ABE 489	Corn Milling Process Design .....	3
ABE 456	Land & Water Resources Engrg .....	3	ABE 497*	Independent Study .....	1-4
ABE 457	NPS Pollution Processes .....	3	ABE 498*	Special Topics .....	1-4
ABE 458	NPS Pollution Modeling .....	3			

# This course is strongly recommended.

\* Technical elective credit may be given with chief advisor approval.

**Other Technical Electives; remainder of the 15 hours from list below or any 300 or 400 level engineering course approved by advisor:**

CEE 330	Environmental Engineering .....	3	GE 320	Control Systems .....	4	
CEE 350	Water Resources Engineering .....	3	GE 330	OR Meth for Profit & Value Eng .....	3	
CEE 360	Structural Engineering .....	3	ME 320	Heat Transfer .....	4	
CEE 380	Geotechnical Engineering .....	3	ME 330	Engineering Materials .....	4	
CEE 450	Surface Hydrology .....	3	ME 350	Design for Manufacturability .....	3	
CEE 460	Steel Structures I .....	3	ME 370	Mechanical Design, I .....	3	
CEE 461	Reinforced Concrete I .....	3	ME 400	Energy Conversion Systems .....	3-4	
CHBE 221	Principles of CHE .....	3	ME 402	Design of Thermal Systems .....	3-4	
CHBE 421	Momentum and Heat Transfer .....	4	ME 461	Computer Ctrl of Mech Systems .....	3-4	
CHBE 422	Mass Transfer Operations .....	4	NPRES	475	Wind Power Systems .....	3-4
ECE 333	Green Electric Energy .....	3	NRES	454	GIS in Natural Resource Mgmt .....	3
ENG 471	Seminar Energy & Sustain Engrg .....	1	PHYS	214	Univ Physics, Quantum Phys .....	2
			TAM	324	Behavior of Materials .....	4