

# CURRICULUM IN AGRICULTURAL & BIOLOGICAL ENGINEERING

Fall 2009

UNIVERSITY of ILLINOIS at URBANA-CHAMPAIGN

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

Agricultural and biological engineering is the integration of biological and physical sciences as a foundation for engineering applications in agriculture, food systems, energy, natural resources, the environment and related biological systems. Agricultural and biological engineers are involved in the design of systems which include food and bioprocess engineering, off-road equipment, bioenvironmental engineering of plant and animal facilities, renewable energy, water quality, and systems for the utilization and protection of soil and water resources. Important design constraints are economics, conservation of materials and energy, safety, and environmental quality. Graduates are employed by industry, consulting firms, and government for research, education, and manufacturing. All graduates obtain a four-year ABET accredited BS degree from the College of Engineering and may receive an optional five-year BS degree from the College of Agricultural, Consumer and Environmental Sciences. By choice of electives, a student may direct his or her program toward specialization in bioenvironmental engineering (BEE), biological engineering, off-road equipment engineering (OREE), and soil and water resource engineering (S&W), or to a separate concentration in food and bioprocess engineering (FBE).

<b>First Semester</b>	<b>Hours</b>	<b><u>FIRST YEAR</u></b>	<b>Second Semester</b>	<b>Hours</b>
ABE 100 - Intro to Agric & Biological Engr .....	1		MATH 231 - Calculus II .....	3
ENG 100 - Engineering Lecture .....	0		MATH 225 - Introductory Matrix Theory.....	2
MATH 221 - Calculus I <sup>2</sup> .....	4		CHEM 104 - General Chemistry II* .....	3
CHEM 102 - General Chemistry I.....	3		CHEM 105 - General Chemistry Lab II* .....	1
CHEM 103 - General Chemistry Lab I.....	1		PHYS 211 - University Physics, Mechanics.....	4
Humanities or Social Science Elective <sup>3,4</sup> .....	3		RHET 105 - Principles of Composition or GE 101 - Engineering Graphics & Design <sup>1</sup> .....	4-3
GE 101 - Engineering Graphics & Design or RHET 105 - Principles of Composition <sup>1</sup> .....	3-4		Total .....	17-16
Total .....	15-16		*Biological Version Recommended	
<b><u>SECOND YEAR</u></b>				
ABE 221 - Agric and Biological Engr I.....	4		ABE 222 - Agric & Biological Engr II.....	4
MATH 241 - Calculus III.....	4		MATH 285 - Intro Differential Equations.....	3
PHYS 212 - University Physics, Elec & Mag .....	4		PHYS 213 - Univ Physics, Thermal Physics.....	2
TAM 210 - Introduction to Statics or TAM 211 - Statics <sup>5</sup> .....	2-3		TAM 212 - Introductory Dynamics.....	3
CS 101 - Intro Computing: Engr & Sci .....	3		Biological and Natural Sciences Elective <sup>6</sup> .....	4
Total .....	17-18		Total .....	16
<b><u>THIRD YEAR</u></b>				
Agric & Biological Engr Technical Elective <sup>7</sup> .....	3		Agricultural & Biological Engr Technical Elective <sup>7</sup> .....	3
TAM 251 - Introductory Solid Mechanics.....	3		TAM 335 - Introductory Fluid Mechanics or CHBE 421 or ME 310 .....	4
ECE 205 - Intro Elec and Electr Circuits.....	3		ME 300 - Thermodynamics or CHBE 321 - Thermodynamics <sup>5</sup> .....	3-4
ECE 206 - Intro Elec and Electr Ckts Lab .....	1		ECON 103 - Macroeconomic Principles <sup>3</sup> .....	3
ABE 440 - Applied Statistical Methods I <sup>5</sup> , CEE 202, STAT 400/MATH 463 <sup>5</sup> , or IE 300 .....	3-4		Humanities or Social Science Elective <sup>3,4</sup> .....	3
Humanities or Social Science Elective <sup>3,4</sup> .....	3		Total .....	16-17
Total .....	16-17			
<b><u>FOURTH YEAR</u></b>				
ABE 430 - Project Management.....	2		ABE 469 - Industry-Linked Design Project.....	4
Agric & Biological Engr Technical Elective <sup>7</sup> .....	3		Technical Elective <sup>7</sup> .....	3
Technical Elective <sup>7</sup> .....	4		Biological and Natural Sciences Elective <sup>6</sup> .....	3
Humanities or Social Science Elective <sup>3,4</sup> .....	3		Humanities or Social Sciences Elective <sup>3,4</sup> .....	3
Free Elective <sup>4</sup> .....	3		Free Elective <sup>4</sup> .....	3
Total .....	15		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 social sciences and humanities requirements of the College of Engineering, including ECON 102, 103 or ACE 100 and the campus general education requirements for social sciences and humanities.

<sup>4</sup> One elective course must satisfy 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 7 hours from the Biological and Natural Sciences approved list.

<sup>7</sup> Students must complete 16 hours of technical electives; at least 8 hours must be from ABE courses and the remainder selected from the department approved Technical Electives List.

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**Biological and Natural Sciences (7 hours)**

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

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

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

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**Technical Electives (16 hours)**

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

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

# This course is strongly recommended.

**Other Technical Electives; remainder of the 16 hours from list below or any 300 or 400 level engineering course approved by advisor:**

CEE 311	Engineering Surveying or CEE 312 .....	4	GE 320	Control Systems .....	4
CEE 330	Environmental Engineering .....	3	GE 330	OR Meth for Profit & Value Eng .....	3
CEE 350	Water Resources Engineering .....	3	ME 330	Engineering Materials .....	4
CEE 360	Structural Engineering .....	3	ME 350	Design for Manufacturability .....	3
CEE 380	Geotechnical Engineering .....	3	ME 370	Mechanical Design, I .....	3
CEE 450	Surface Hydrology .....	3	ME 461	Computer Ctrl of Mech Systems .....	3-4
CEE 460	Steel Structures I .....	3	MFGE 310	Manufacturing Systems .....	3
CEE 461	Reinforced Concrete I .....	3	MFGE 450	Info Mgmt in Manufacturing .....	3
CHBE 221	Principles of CHE .....	3	PHYS 214	Univ Physics, Quantum Phys .....	2
CHBE 421	Momentum and Heat Transfer .....	4	TAM 324	Behavior of Materials .....	4
CHBE 422	Mass Transfer Operations .....	4			