



**KENTUCKY STATE  
UNIVERSITY**

# BACHELOR OF SCIENCE - BIOLOGICAL AND AGRICULTURAL ENGINEERING

## Plan of Study

Course	Title	Hours
<b>Year 1</b>		
<b>Term 1 (Fall)</b>		
CHE 101	General Chemistry I	3
CHE 110	General Chem I Laboratory	1
ENG 101	English Comp I	3
MAT 131	Calculus/Analy Geom I	5
KSU 118	Intro. to University Learning	3
<b>Hours</b>		<b>15</b>
<b>Term 2 (Spring)</b>		
ENG 102	English Comp II	3
MAT 132	Calculus/Analy Geom II	5
COM 103	Interpersonal Communication	3
BIO 111	Principles of Biology	4
MFG 208	Computer Aided Design	3
<b>Hours</b>		<b>18</b>
<b>Year 2</b>		
<b>Term 3 (Fall)</b>		
BAE 201	Analysis of Bio & Agri Eng Pro	3
EGR 220	Intro to Mat, Proc. & Test	3
CHE 200	Intro to Organic & Biochem	4
MAT 232	Differential Equations	3
PHY 211	General Physics I	5
<b>Hours</b>		<b>18</b>
<b>Term 4 (Spring)</b>		
PHY 311	Statics	3
BAE 301	Bio. & Agri. Eng. Fund. I	3
BUA 120	Business and Society	3
PHY 320	Engineering Thermodynamics	3
PHY 212	General Physics II	5
<b>Hours</b>		<b>17</b>
<b>Year 3</b>		
<b>Term 5 (Fall)</b>		
EGR 320	Fluid Pwr Tech & Lab	3
BAE 302	Biol. & Agri. Eng. Fund II	3
BAE 321	Mechanics of Materials	3
BAE 355	Engi. Prop. of Biol Materials	3
BAE 360	Design Fund for Agri Mach & St	3
<b>Hours</b>		<b>15</b>
<b>Term 6 (Spring)</b>		
BAE 365	Unit Oper. for Bio. & Agr. Eng	3
BAE 366	Trans. Proc. in Bio Systems	3
BAE 370	Meas. & Cont. of Bio Sys & Agr	3
PHY 305	Elec Circuits/Electronics	3
Select one General Education Social Science Course SCIENCE		3

FIN 101	Financial Literacy	
ECO 201	Prin of Economics I	
<b>Hours</b>		<b>15</b>
<b>Year 4</b>		
<b>Term 7 (Fall)</b>		
BAE 400	Professional Development	3
EGR 421	Capstone Design I	3
BAE 410	Hydraulic Power (or BAE 415 or BAE 420 or BAE 422 or BAE 425)	3
BAE 415	Renewable Energy Conversion ( BAE 420 or BAE 422 or BAE 425)	3
Select one General Education Arts Course		3
ART 130	Introduction to Art	
MUS 130	Introduction to Music	
THE 130	Introduction to Theatre	
ENG 211	Intro to Literature	
<b>Hours</b>		<b>15</b>
<b>Term 8 (Spring)</b>		
EGR 422	Capstone Design II	3
BAE 420	Food Rheology (or BAE 422 or BAE 425)	3
EGR 222	Econ. Ana. for Engin & Tech (or EGR 420)	3
Select one General Education Behavioral Science Course SCIENCE		3
PSY 200	General Psychology	
SOC 203	Principles of Sociology	
Select one General Educational Global/Civic Course		3
AFE 117	Global Perspect Ag/Food/Env	
ASP 303	American Civil Rights Movement	
POS 101	American Government	
POS 361	World Politics	
<b>Hours</b>		<b>15</b>
<b>Total Hours</b>		<b>128</b>

## Biological & Agricultural Engineering (BAE)

### BAE 201: Analysis of Bio & Agri Eng Pro

Overview of Biological and Agricultural Engineering discipline through case studies and engineering design problems; introduction to engineering design utilizing computer programming, 3-D computer-aided modeling an 2-D engineering drawings; introduction to manufacturing processes.

**Prerequisite:** Grade of C or better MFG 208, MAT 131, CHE 101 & 110

**Credit Hours:** 3

**Contact Hours:** 4

### BAE 301: Bio. & Agri. Eng. Fund. I

Fundamental engineering concepts related to agricultural systems including the environment (soil, water, and air), plant and animal production systems and processing, and associated machines and facilities; application of techniques for data collection and analysis to problems in biological and agricultural engineering; design of experiments and communication of experimental results.

**Prerequisite:** Grade of C or better in PHY 311 or concurrent enrollment

**Credit Hours:** 3

**Contact Hours:** 4

**BAE 302: Biol. & Agri. Eng. Fund II**

Fundamentals of microbiology and biochemistry as they apply to biological and agricultural engineering systems to produce useful products and/or benign wastes; topics include microbiology, chemistry of biomolecules, microbial metabolism, bioenergetics, kinetics, mass transfer, bioreactor design, bioprocesses, and downstream processing.

**Prerequisite:** Grade of C or better in BIO111, CHE 200 or concurrent enrollment

**Credit Hours:** 3

**Contact Hours:** 4

**BAE 321: Mechanics of Materials**

Applications of conservation principles and stress/deformation relationships for continuous media to structural members; axially loaded members; thin-walled pressure vessels; torsional and flexural members; shear; moment; deflection of members; combined loadings; stability of columns; nonsymmetrical bending, shear center; indeterminate members; elastic foundations.

**Prerequisite:** Grade of C or better in PHY 311

**Credit Hours:** 3

**Contact Hours:** 3

**BAE 355: Engi. Prop. of Biol Materials**

Relationships between composition, structure and properties of biological materials; definition and measurement of mechanical, physical, thermal and other material properties; variability of properties; application of properties to engineering analysis and design of biological and agricultural processes and systems.

**Prerequisite:** Grade of C or better in EGR 220

**Credit Hours:** 3

**Contact Hours:** 4

**BAE 360: Design Fund for Agri Mach & St**

Applications of stress/strain relationships and failure theory to the design of agricultural machines and structures; structural properties of engineering materials; finite element analysis and computer aided engineering design.

**Prerequisite:** Grade of C or better in PHY 311

**Credit Hours:** 3

**Contact Hours:** 3

**BAE 365: Unit Oper. for Bio. & Agr. Eng**

Theoretical and practical understanding of basic unit operations required to design processes and equipment in the agricultural, biological, environmental, and food industries, with unique constraints presented by biological and agricultural systems considered in design of all units.

**Prerequisite:** Grade of C or better in PHY 320, BAE 321 junior or senior classification

**Credit Hours:** 3

**Contact Hours:** 4

**BAE 366: Trans. Proc. in Bio Systems**

Basic principles governing transport of energy and mass; application of these principles to analysis and design of processes involving biological, environmental and agricultural systems.

**Prerequisite:** Grade of C or better in PHY 320, EGR 320, BAE 365 or concurrent enrollment; grade of C or better in MATH 232; junior or senior classification

**Credit Hours:** 3

**Contact Hours:** 3

**BAE 370: Meas. & Cont. of Bio Sys & Agr**

Theory and application of sensors and techniques in the design of systems for automatic control in biological systems and agricultural production and processing; sensor operation; signal processing; control techniques; automation and robotics.

**Prerequisite:** Grade of C or better in PHY 305

**Credit Hours:** 3

**Contact Hours:** 4

**BAE 400: Professional Development**

Participation in an approved high-impact learning practice; reflection on professional outcomes from the National Society of Professional Engineers' Engineering Body of Knowledge; documentation and self-assessment of learning experience.

**Prerequisite:** senior classification; or approval of instructor

**Credit Hours:** 3

**Contact Hours:** 3

**BAE 410: Hydraulic Power**

Hydraulic power systems; energy and power relationships; hydraulic fluid properties; frictional losses in pipelines; hydraulic pumps, cylinders, valves and motors; servo and proportional valves; circuit design and analysis; conductors, fittings and ancillary devices; maintenance of hydraulic systems; pneumatic components and circuits; electrical controls and fluid logic; electro-hydraulic systems.

**Prerequisite:** Grade of C or better in EGR 320 or equivalent, or approval of instructor

**Credit Hours:** 3

**Contact Hours:** 3

**BAE 415: Renewable Energy Conversion**

Energy/power systems through engineering and technical aspects of quantifying and designing the suitability of several types of renewable energy resources; new insights of vast resources that future engineers can harness to augment diminishing supplies of nonrenewable energy.

**Prerequisite:** Grade of C or better in PHY 320 or equivalent, or approval of instructor

**Credit Hours:** 3

**Contact Hours:** 4

**BAE 420: Food Rheology**

Theoretical and applied learning of rheology of food materials necessary for processing and preservation; topics include viscous liquids, structured materials, and hard solids; fundamental relationships between materials structure and measured properties to observed physical and performance behavior with regard to processing and mouthfeel.

**Prerequisite:** Junior or senior classification or approval from instructor

**Credit Hours:** 3

**Contact Hours:** 3

**BAE 422: Unit Oper. in Food Processing**

Design of food process engineering systems; basic concepts of rheology and physical properties of foods; fundamentals of heat and mass transfer and process control.

**Prerequisite:** Grade of C or better in BAE 321

**Credit Hours:** 3

**Contact Hours:** 4

**BAE 425: Engineering Aspects of Packagi**

Introduction to properties and engineering aspects of materials for use as components of a package and/or packaging system; principles of design and development of packages; evaluation of product-package-environment interaction mechanisms; testing methods; environmental concerns; regulations; food packaging issues.

**Prerequisite:** Junior or senior classification or approval of instructor

**Credit Hours:** 3

**Contact Hours:** 3