College of Agriculture, Food Science, and Sustainable Systems

The CAFSSS works to uphold the mission of the University through its commitment to research, extension, and teaching in the food and agricultural sciences. The College is organized around five divisions: (1) Agriculture and Natural Resources; (2) Aquaculture; (3) Environmental Studies and Sustainable Systems; (4) Food and Animal Science; and (5) Family & Consumer Sciences. The CAFSSS mission is to provide excellence in teaching, research, and Extension in agriculture, food and family sciences, and sustainable systems. The various programs of the College are supported by federal and state funds. Each of the five Divisions works to fulfill the requirements of the Morrill Act of 1890 by advancing the three pillars of the land grant mission: research, extension, and teaching which Land Grant programs nationwide were founded upon.

Research
The CAFSSS has nationally and internationally recognized research programs in aquaculture or fish farming, organic agriculture, sustainable biofuel feedstock production, alternative fruit and nut crops, ecological entomology, alternative pesticides and water quality, goat production, obesity and human health, and apiculture. The Aquaculture Program, KSU’s “Program of Distinction,” is widely recognized as being a national and international leader in the areas of paddlefish culture, freshwater prawn culture, Koi breeding, production of largemouth bass on-feed, and fish meal replacement research for catfish and hybrid striped bass. Additionally, KSU boasts the largest multi-disciplinary team organic agriculture program in the 1890s Land Grant system; recently released its first pawpaw fruit variety, KSU-Atwood™; and created the “Shape Up-KSU” program for assessing risk factors for metabolic syndrome in African-American young adults.

These research programs provide mentoring opportunities for students in degree programs as well as faculty experienced in cutting edge research techniques in areas important to agricultural, aquaculture, food, and environmental sciences. The Atwood Research Facility contains 7,000 square feet of office space and 7,000 square feet of laboratory space, including a molecular genetics laboratory and nutrition laboratory. KSU’s Aquaculture Research Center (ARC) includes 33 research ponds, a 3,000-square-foot hatchery houses spawning, holding, and experimental tanks, and a 4,000-square-foot office/laboratory building includes a state-of-the-art histology laboratory, offices, and conference/classroom space. Augmenting these facilities are KSU’s 300 acre Research and Demonstration Farm and its 300 acre Environmental Education Center. The KSU farm has goat, beef, poultry, and fruit and vegetable trials, and 11 acres of certified organic land which hosts a range of projects in organic agriculture.

Extension and Outreach
The Cooperative Extension Program (CEP) provides education and technical assistance to limited-resource families and communities by meeting the needs of homemakers, farmers, youth, the elderly, and many others. Some Extension programs
provide one-on-one opportunities where paraprofessionals work directly with family members. The CEP has nationally and internationally recognized programs in: family and consumer sciences, family development and management, family financial management and consumer education, small farmer outreach training and technical assistance, apiculture, goat production, community resource development, entrepreneurship, 4H and youth development, and Hispanic initiatives. Program accomplishments include: the 3rd Thursday Sustainable Agriculture Workshop series, the Strengthening Kentucky Families (SKY Families) Program providing parenting education classes to persons who have lost custody of their children through the family court system, award-winning programs in financial management, and the Small and Part-time Farmer Program.

Extension program facilities include the new Center for Sustainable Farms and Families, a $5 million dollar, 12,000 square foot, 600-seat building at the KSU Research and Demonstration Farm and the Cooperative Extension Building, which also houses a television studio and state-of-the-art communications equipment available for use by all of CAFSS. The geographic information systems (GIS) laboratory is also located in the Cooperative Extension Building and is utilized by students, faculty and by agricultural research and extension staff to support their activities.

**Teaching and Degree Programs**

Today’s world needs people prepared to solve global challenges related to agribusiness, climate change, a safe and reliable food supply, protection of natural resources, improved nutrition, public health, and alternative energy sources. The United States Department of Agriculture and U.S. Department of Labor predict significant job growth in the areas of food, renewable energy, and environment. Increased demand is expected for agricultural inspectors, environmental scientists and specialists, including health, agriculturists and food scientists, soil and plant scientists, conservation scientists, forest and conservation technicians, agricultural and environmental law, public and agricultural policy, biotechnology, fisheries, and wildlife, economic development, and agricultural communications. A degree from KSU’s CAFSSS will prepare graduates for a variety of jobs in these fields.

The CAFSSS baccalaureate degree program in Agriculture, Food, and Environment (AFE) with four individual Options in Agricultural, Food, Environmental, and Aquaculture Systems is offered to allow training of graduates in these growth areas in the U.S. economy. Using an interdisciplinary approach, students from diverse backgrounds will develop a broad understanding of relationships between agricultural and aquaculture systems, food safety, and the environment.

The CAFSSS also offers Masters degrees in Aquaculture/Aquatic Science, and Environmental Studies (MES).

**Requirements for a Baccalaureate Degree in AFE**

Students must complete a total of 120 credit hours in the specified areas, which includes a Liberal Studies Requirement of 53 semester credit hours. Each Option will require 43 credit hours of required and elective courses, as well as 15 credit hours in supporting courses. Whitney Young Students must complete a total of 121 credit hours in the specified areas; with each Option requiring 43 credit hours of required
and elective courses, as well as 18 credit hours in supporting courses.

Options in Agricultural, Food, Environmental, and Aquaculture Systems each incorporate Required AFE Core courses (AFE 116, 117, 211, 217, 311, 340, 411, 401, and 450), plus four option requirements and three option electives:

A) **Option in Agricultural Systems** requires the online course AEC 305-Food and Agricultural Marketing Principles offered at the University of Kentucky, AFE 318, 334, and 445. Acceptable option electives will include AFE 425, AFE 435, AFE 440, AQU 480 and other AFE and AQU courses with advisor consent.

B) **Option in Food Systems** requires FNU 104, AFE 455, AFE 465, and BIO 302. Acceptable option electives will include BIO 303, AFE 435, AFE 445, NUR 412, BIO 408, and other AFE or AQU courses.

C) **Option in Environmental Systems** requires BIO 316, AQU 480, AFE 334, and AFE 318 or AQU 413. Acceptable option electives will include AFE 425, BIO 417, AFE 445 and other AFE or AQU courses.

D) **Option in Aquaculture Systems** requires AQU 411, AQU 421, AQU 422, and AQU 460. Option electives include AQU 425, AQU 412, AQU 427, and other AFE or AQU courses.

The major requirements satisfy the natural sciences requirements for the Liberal Studies General Core (Section III.C) as well as the math requirement (Section I).

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<thead>
<tr>
<th>Liberal Studies Core</th>
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<tr>
<td>IGS</td>
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<tr>
<td>Required AFE Courses</td>
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<tr>
<td>AFE Option Courses</td>
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<tr>
<td>Support Courses</td>
<td>15 credits**</td>
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<tr>
<td>Free electives</td>
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<td><strong>Total</strong></td>
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*Required as part of the Liberal Studies Core: ECO 200, PHY 130, SOC 203
**Required support courses: CHE 101, CHE 102, CHE 110, CHE 120, MAT 115, BIO 111

For Whitney Young Students, students must complete a total of 121 credit hours in the specified areas:

<table>
<thead>
<tr>
<th>Whitney Young Core</th>
<th>48 credits</th>
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<tr>
<td>Required AFE Courses</td>
<td>22 credits</td>
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<tr>
<td>AFE Option Courses</td>
<td>21 credits</td>
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<tr>
<td>Support Courses</td>
<td>18 credits*</td>
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<tr>
<td>Free electives</td>
<td>12 credits</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>121 credits</strong></td>
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*Required support courses: CHE 101, CHE 102, CHE 110, CHE 120, MAT 115, BIO 111, ECO 200

**Minor in AFE**
A minor in AFE requires the completion of a minimum of 21 semester credit hours in AFE. A student pursuing a minor in AFE will be required to successfully complete BIO 111. AFE courses are chosen from the core requirements or option elective courses.

**Course Descriptions**

**AFE 116 Introduction to Agriculture, Food, and the Environment.** Students examine career options, necessary academic preparation, and how to search for jobs in agriculture, food and environment. In addition to lectures, students will visit a sustainable small farm, small business/nursery involved in agriculture, a locally owned and operated environmental consultant business, Kentucky State Nature...
Preserves Commission and an Agricultural Research company located in central Kentucky.

**AFE 117 Global Perspectives in Agriculture, Food, and the Environment.** Students will explore agriculture, food science, and environmental issues across the planet and how these issues also impact people in the United States. Climate change, international challenges to food production, expanding international markets, global competition in producing food and energy, and international environmental challenges will be examined. Specific AFE issues in Asia, Africa, Cuba, Europe, and Mexico/South America will be discussed, as well as opportunities for international study by students.

**AFE 211 Introduction to Animal Science.** Prerequisite: BIO 111. Explore interactions between animal production systems and the environment. Impact of animal production on water and nutrient cycles, greenhouse gas balance, and soil quality in relation to sustainable animal production systems. Economic, social, and ecological considerations for ruminant, swine, and poultry production.

**AFE 217 Plant Science.** Prerequisite: BIO 111. Explore interactions between crop production systems and the environment. An introduction to food and ornamental crops, plant form and function, plant life cycle, plant health and nutrition, and conventional and organic production practices in field and greenhouse settings.

**AFE 311 Practicum I.** Prerequisite: Consent of instructor. Intensive experience involving practical on-site participation working in option area (University, state, or private).

**AFE 318 Environmental Entomology.** Prerequisite: BIO 111. Basic insect biology and relationships among insects, plants, and other organisms; identification of commonly encountered insects, interaction of insects with the biological, chemical, and physical aspects of their environment. Principles of insect damage and various types of natural and applied control methods, including natural products, traditional insecticides, transgenic insecticidal cultivars, biological and microbial controls and chemical ecology.

**AFE 334 Soil Science.** Explore interactions between soil, agriculture, and the environment. Topics include soil classification, formation and loss; soil biology; soil and water quality; soil contamination and remediation; nutrient management.

**AFE 340 Environmental Science and Agroecology.** Prerequisite: AFE 211 and 217 with grade of C or better. Introduction to ecological underpinnings of conventional, sustainable, and organic agriculture. Survey of beneficial and antagonistic interactions between plants, animals, fungi, protists, and bacteria commonly found in agro-ecosystems. Discussion of competition, predator-prey dynamics, herbivory, disease, biological control, and management tactics that optimize farmer benefits.

**AFE 401 AFE Seminar.** Prerequisite: Upper-division standing; senior classification recommended. Expose students to presentations of environmental science and agriculture research efforts by faculty and visiting scientists and allow students to formally present a research topic. Students make a formal, oral presentation of a research topic with computer-generated audio-visual materials.
AFE 411 Practicum II. Prerequisite: Consent of instructor. Intensive experience involving practical on-site participation working in option area (University, state, or private).

AFE 425 Organic Agriculture. Principles and practices of organic agriculture are presented in the context of their historical, philosophical, economic, and scientific underpinnings. Students will develop a broad theoretical and practical understanding of organic agriculture.

AFE 435 Urban Agriculture. Examine contributions of ornamental and food gardens to community health and food system sustainability. Explore potential of compact urban agriculture to offset community food needs through high and low input production. Gain hands-on experience with tools, techniques and practices used to grow and process food and ornamental crops in urban environments.

AFE 440 Ornamental/Landscape Plants. Identification, morphology, classification, nomenclature and adaptability of ornamental plants in landscape environments. Use of plants in home, business, and park landscapes to reduce water use, pollutants, energy and labor inputs. Use of native plants for therapeutic environments that promote human health, limit spread of invasive plants, and promote local plant/wildlife.

AFE 445 Agriculture & Energy. Examine agriculture’s role as a producer and consumer of energy in context of the broader food system. Explore potential to improve agricultural energy efficiency and produce energy on farms using solar, wind, hydro, biopower, and biofuel technologies.

AFE 450 Human Health & Environment. Explore interactions between health, chemical exposure, water quality, air quality, and agriculture. Other topics include environmental justice, case studies of environmental health disasters, waste disposal, risk, urbanization, and links between global warming and health.

AFE 455 Food Microbiology and Safety. Survey food and nutrition principles, including nutrients, diet; nutritional effects of food processing, storage, and preparation; food safety, fads, and current controversies. Gain hands-on experience with techniques used to prepare food.

AFE 465 Food Systems. Explore relationships among environment, food supply chains, security, quality, diet, and consumer health, with particular emphasis on system components after the farm gate. Discuss existing barriers to healthy and sustainable food consumption, behaviors and policies with potential to overcome these barriers.