Agricultural and Environmental Systems
Career Field Pathways and Course Structure

Courses in Agribusiness & Production Systems (A0)

PATHWAY COURSES	SUBJECT CODE
Agriculture, Food and Natural Resources[1]	010105
Animal Science and Technology[2]	010910
Plant and Horticultural Science[2]	010155
Agronomic Systems	010620
Animal Nutrition, Health and Reproduction	010915
Business Management for Agricultural and Environmental Systems	010115
Greenhouse and Nursery Management	010610
Livestock Science	010920
Meat Science & Technology	011020
Small Animal Science	010925
Veterinary Science	010930
ELECTIVES	**SUBJECT CODE**
Agricultural and Environmental Systems Capstone[3]	010190
Agricultural & Industrial Power[2]	010210
Animal and Plant Biotechnology[2]	012010
Communications and Leadership	010110
Energy Systems Management	010715
Environmental Science for Agriculture and Natural Resources	010720
Equine Science and Management	010935
Natural Resources[2]	010710
Science & Technology of Food[2]	011010
Structural Engineering	010120

[1]First course in the Career Field; [2]First course in the Pathway; [3]Does not count as one of the required four courses

Agriculture, Food and Natural Resources
Subject Code: 010105
This is the first course in the Agricultural and Environmental Systems career field. It introduces students to the pathways that are offered in the Agricultural and Environmental Systems career field. As such, learners will obtain fundamental knowledge and skills in food science, natural resource management, animal science & management, plant & horticultural science, power technology and biotechnology. Students will be introduced to the FFA organization and begin development of their leadership ability.

Animal Science and Technology
Subject Code: 010910
Learners will develop business leadership, problem-solving and communication skills in relation to the science and technology of animals. Students will learn responsible animal management principles and routine husbandry practices in relation to animal welfare and behavior. Learners will identify and describe the anatomy and physiology of monogastric and ruminant organisms as it applies to nutrition, reproduction, and animal health. Learners will investigate animal genetics and how it impacts principles of animal improvement, selection and marketing.

Plant and Horticultural Science
Subject Code: 010155
This first course in the pathway focuses on the broad knowledge and skills required to research, develop, produce and market agricultural, horticultural, and native plants and plant products. Students will apply principals and practices of plant physiology and anatomy, plant protection and health, reproductive biology in plants, influences in bioengineering, plant nutrition and disorders. Environmental aspects of irrigation, chemical application, soils, and pest management will be studied and applied. Projects and activities will enable students to develop communication, leadership, and business management skills.

Agronomic Systems
Subject Code: 010620
This course focuses on the knowledge and skills required to research, develop, produce and market major agricultural and horticultural crops. Cultural and sustainable production practices will be examined. Students will apply scientific knowledge of plant development, nutrition and growth regulation. The knowledge and skills needed to manage water, soils, and pests related to agronomic crops will be learned. Students will employ communication, business, and management strategies appropriate for the industry.

Animal Nutrition, Health and Reproduction
Subject Code: 010915
Learners will apply principles of nutritional management for various classes of animals. Learners will analyze nutritional content/quality of feeds; formulate rations; develop feeding recommendations; identify deficiency symptoms and implement corrective methods as needed. Care/management plans are developed that reflect the classification of animals and follows best practices and legal compliance. Learners will monitor/evaluate the quality of animal habitats and estimate carrying capacity as it relates to the impact of the environment and animal health.

Business Management for Agricultural and Environmental Systems
Subject Code: 010115
Learners will examine elements of business, identify organizational structures and identify and apply management skills. Learners will develop business plans, financial reports and strategic goals for new ventures or existing businesses. Learners will use marketing concepts to evaluate the marketing environment and develop a marketing plan with marketing channels, product approaches, promotion and pricing strategies. Learners will practice customer sales techniques and apply concepts of ethics and professionalism while understanding related business regulations.

Greenhouse and Nursery Management
Subject Code: 010610
The course will apply principles of science, engineering, and business to support the sustainable propagation and production of plants in a commercial nursery or greenhouse facility. Management of soil/media, water and nutrient distribution, lighting, ventilation and temperature, and pests will be learned and applied. Students will demonstrate knowledge of propagation methods, plant health, nutrition, and growth stimulation. Students will develop successful business, communication, marketing, and sales strategies for use in the greenhouse and nursery industries.

Livestock Science
Subject Code: 010920
Learners will apply principles of nutrition, health and reproduction to the management of animals, poultry and fish in production agriculture. Learners will demonstrate understanding of anatomy and physiology and apply genetic principles for improvement. Learners will apply knowledge of animal behavior, welfare, and husbandry principles. Learners will evaluate body/carcass composition and apply marketing principles to the sale and distribution of livestock products. Learners will employ communication, business, and management strategies appropriate for the industry.

Meat Science and Technology
Subject Code: 011020
Learners will apply food chemistry and microbiology to processing, preservation, packaging, storage and marketing of meat products. Learners will design and implement a quality assurance program that meets legal compliance. Learners will evaluate carcass composition, assign quality grades, and examine valued-added products. Learners will demonstrate knowledge of safety regulations and operate and maintain equipment and facilities. Learners will practice customer service and sales techniques while understanding the scope and importance of business regulations.

Small Animal Science
Subject Code: 010925
Learners apply principles of nutrition, health and reproduction to the management of animals intended for companionship or research. Through interpretation, problem-solving and diagnostic methods, the learners develop and implement management programs that reflect responsible animal behavior, welfare and husbandry practices. Learners implement principals and practices of nutritional management, responsible breeding and disease management. Safe handling, grooming and training skills are developed and applied. Learners identify business management procedures and understand the importance of business regulations.

Veterinary Science
Subject Code: 010930
Learners will develop knowledge of veterinary pharmacology, radiology and imaging techniques, principles of surgery, safe laboratory skills, and the concepts of ethics and professionalism in the work place. Learners will develop skills in inquiry and statistical methods. Learners will describe causes, symptoms, and treatment of common diseases with special emphasis on developing preventative health management plans and breeding programs. Learners will utilize principles of technology to manage information systems, and research issues affecting the industry.

Agricultural and Environmental Systems Capstone
Subject Code: 010190
The capstone course is an opportunity for students to solve problems and demonstrate that they have achieved the requisite knowledge and skills in their chosen Agricultural and Environmental Systems career field pathway. The course is designed to assess cognitive, affective and psychomotor learning and to do so in a student-centered and student-directed manner. The capstone requires the application of learning to a project that serves as an instrument of evaluation.

Agricultural and Industrial Power
Subject Code: 010210
The A&I *Power* course will introduce students to the breadth of the Agricultural and Industrial Power Technology pathway. Students will learn the principles of agricultural and industrial power technology equipment systems including electronic, electrical, engines, fuel, hydraulics, and power trains. Additionally, students will learn to operate and maintain agricultural & industrial equipment.

Animal and Plant Biotechnology
Subject Code: 012010
Learners will apply principles of chemistry, microbiology and genetics to plant and animal research and product development. They will describe the importance of biotechnology in society, and analyze the issues that have affected agricultural biotechnology. Students will apply genetic principals to determine genotypes and phenotypes. Students will describe the parts and functions of animal and plant cells and their importance in biochemistry.

Communications and Leadership
Subject Code: 010110
Students will analyze attributes and capabilities of those in leadership positions and develop their communication and leadership skills in authentic situations. The course prepares students to apply journalistic, communication and broadcasting principles to the development, production, and transmittal of agricultural and environmental systems information.

Energy Systems Management
Subject Code: 010715
Students will apply basic principles of energy accounting, thermodynamics and heat transfer, energy conversion and efficiency to heating, power generation and transportation. Students will apply the principles and practices needed for managing both renewable and non-renewable energy sources including, solar thermal, hydrogen generation, photovoltaic, hydroelectric, biomass use, geothermal heat transfer, and fossil fuel. Future energy systems and energy use scenarios are investigated, with a focus on promoting the use of renewable energy resources and technologies.

Environmental Science for Agriculture and Natural Resources
Subject Code: 010720
Learners will study relationships between organisms and their environment. Principles of biogeochemical cycles, air-water-land relationships, non-point pollution, and wetlands will be applied. Learners will examine economic fundamentals of resource development, agriculture sustainability, energy needs and pollution control. Learners will analyze and interpret data gathered from ecosystems, population studies, forest management practices, pesticide use, land use and waste management. Learners will develop responses to environmental problems and develop management strategies for responsible conservation and resource development.

Equine Science and Management
Subject Code: 010935
Learners are introduced to responsible equine management principals and routine husbandry practices in relation to equine behavior methodology and legal compliance. Learners will apply knowledge of health and nutrition when designing preventative health care plans, breeding plans, and feed management programs. Safe handling, grooming, training, equipment selection/maintenance/use and emergency care techniques are developed and applied. Learners will evaluate responsible stewardship practices and develop production management strategies that emphasize the industries goals through good reproductive decision-making.

Natural Resources
Subject Code: 010710
Learners will apply science principles and management practices to the protection of renewable and non-renewable natural resources. Students will learn fundamentals of land use as well as watershed, wildlife, fishery and forest management. Students will be introduced to management practices related to managing air and water quality along with requirements for managing solid and liquid waste. Communications, business principles and leadership skill development are essential to the program.

Science and Technology of Food

Subject Code: 011010

This first course in the pathway examines the research, marketing, processing and packaging techniques applied to the development of food products. Learners will examine principles of food preservation techniques and determine correlations to food sensory, shelf life and food stability. Learners will examine and develop food safety, sanitation, and quality assurance protocol. Government regulations and food legislation will be examined and the implications to food science and technology will be identified.

Structural Engineering

Subject Code: 010120

Students will apply principles of engineering and design along with an understanding of the properties and uses of construction materials to buildings and structures used in agriculture, horticulture and natural resources. The course will focus on the study and utilization of wood and lumber, metals, concrete and masonry, pipes and plumbing, and electrical systems. Students will design, plan, build and calculate costs-benefits analysis for construction projects while abiding by all building code and safety regulations.