Florida CTE

Agriculture, Food and Natural Resources: Advanced Concepts of Agriscience: Grades 11-12

Conduct a research project in agriculture using the scientific method, interpret research information, and prepare and present a research project. The student will be able to: 1.0	**1** Formulate hypotheses referencing prior research and knowledge. 1.1 **2** Conduct controlled experiments or simulations to test hypotheses. 1.2 **3** Collect, organize and analyze data accurately and precisely. 1.3 **4** Design procedures to test the selected hypotheses. 1.4 **5** Report, display and defend the results of investigations to audiences that may include professionals and technical experts. 1.5 **6** Estimate and suggest ways to reduce the degree of risk involved in activities in agriculture and related sciences. 1.6
Apply enhanced leadership and professional career skills. The student will be able to: 2.0	**1** Identify and investigate a current agricultural issue. 2.1 **2** Evaluate and explain AFNR issues and their impacts to audiences with limited AFNR knowledge. 2.2 **3** Identify the opportunities for enhanced leadership development available through the National FFA Organization and/or professional organizations. 2.3 **4** Enhance written and oral communications through developing resumes and interviews. 2.4
Illustrate agricultural applications of physical science concepts and principles. The student will be able to: 3.0	**1** Compare physical, ecological and behavioral factors that influence interactions and interdependence of organisms. 3.1 **2** Evaluate Sustainability policies and plans and prepare summary of potential improvements for AFNR businesses or organizations. 3.2 **3** Analyze the properties of materials (e.g., mass, boiling point, melting point, hardness) in relation to their physical and/or chemical structures. 3.3

	4 Analyze factors that influence the relative motion of an object (e.g., friction, wind shear, cross currents, potential differences). 3.4
	5 Analyze reactions (e.g., burning of fuel, decomposition of waste) in natural and man-made energy systems. 3.5
	6 Describe the need for organization, supervision, rules, policies and procedures. 3.6
Investigate the concepts, principles, and theories associated with the classification, growth, function, and reproduction of plants and soils. The student will be able to: 4.0	1 Describe biotechnology and genetic engineering. 4.1
	2 Discuss the benefits and risks of biotechnology and genetic engineering. 4.2
	3 Describe the functions of water in plant growth. 4.3
	4 Identify major sources of water pollution and possible measures for its control. 4.4
	5 Contrast the biochemistry and functions of plant cell membranes and cell walls. 4.5
	6 Describe and give functions for common plant cell types. 4.6
	7 Identify cell types and functions associated with the vascular, dermal, and ground tissue systems in woody and herbaceous plant parts. 4.7
	8 Compare and contrast periderm and epidermis and xylem and phloem. 4.8
	9 Explain how differential gene expression is what determines which proteins are made, and how the proteins decide the characteristics and functions of a particular cell. 4.9
	10 Describe methods of producing transgenic plants and ways in which they are used. 4.10
Investigate concepts associated with animal taxonomy, life at the cellular level, organ systems, genetics, ecology, and related current issues to understand animal life and animal science as it pertains to agriculture. The student will be able to: 5.0	1 Identify the major features of chordates, identify the highlights of vertebrate evolution (development of jaws, cartilage to bone, and water to land), and identify the distinguishing characters of fish, birds, and mammals. 5.1
	2 Describe the biochemistry and functions of animal cell membranes. In doing so, describe the fluid mosaic model of the membrane and the role of the cell membrane proteins in transporting materials in and out of cells. 5.2
	3 Using examples relevant to animal science, track the events involved in expression of individual genes and compartmentalization of the resulting proteins. 5.3
	4 Discuss four basic tissue types: epithelial, connective, muscle, and nervous. 5.4

	5 Describe the chemical process in the formation of bones and muscles and the process of calcification and its impact on animal growth. 5.5
	6 Describe homeostasis and how it is controlled. 5.6
	7 Explain the flow of genetic information and identify the central dogma: DNA transcription-mRNA-translation-protein. 5.7
	8 Describe the purpose, function, and production of RNA, and explain how protein synthesis works. 5.8
Investigate how chemistry and physics principles are applied to the composition of foods, food nutrition, and microbiology as it is associated with the food science segment of agriculture. The student will be able to: 6.0	1 Describe composition and arrangement of functional groups found in biological systems. 6.1
	2 Discuss the chemical composition and structure of protein molecules including primary, secondary, tertiary, and quaternary structures. 6.2
	3 Discuss the biochemical and physiological functions of proteins, carbohydrates, lipids, vitamins, and minerals. 6.3
	4 Explain thermodynamics and kinetics (e.g., reaction rates for affecting quality and destroying nutrients). 6.4
	5 Compare and contrast the chemical reactions initiated by the effect of heat, oxygen, acid, and light during processing and storage of foods. 6.5
	6 Identify the various food spoilage methods including microbial spoilage, chemical spoilage, and their effect on food product shelf-life. 6.6
	7 Compare and contrast three types of chemical bonds: hydrogen, ionic and covalent bonds. 6.7
Apply enhanced agricultural communication and/or agricultural sales skills. The student will be able to: 7.0	1 Evaluate the effectiveness of a current communications or marketing campaign. 7.1
	2 Develop and implement a communications or marketing campaign for an agricultural product or issue. 7.2
	3 Apply enhanced written and oral communication skills by selecting the correct style, tone, and format appropriate for a variety of settings. 7.3
	4 Demonstrate characteristics of a responsible/ethical agricultural communicator. 7.4
	5 Select the proper communication medium and target audience for a current agricultural issue. 7.5