

Florida Department of Education
CURRICULUM FRAMEWORK

Program Title: Food Science Applications
Occupational Area: Agriscience and Natural Resources

Secondary

Program Numbers 8129200
CIP Number 0102030100
Grade Level 9-12, 30, 31
Length 3 credits
Certification VOC AGRI @4
AGRI @4
AGRICULTUR 1 @2

Program SOC Code - 19-4011.02 - Food Science Technicians

- I. **MAJOR CONCEPTS/CONTENT:** The purpose of this program is to prepare students for employment in the food industry or to provide supplemental training for persons previously or currently employed in this industry.

This program focuses on broad, transferable skills and stresses understanding and demonstration of the following elements of the agriculture industry; planning, management, communication skills, community issues and health, safety and environmental issues.

Completers of this program will be prepared to enter advanced training and education in the field of food science. They may also be employed in various related positions in the food industry.

The content includes, but is not limited to, instruction in the application of biological, chemical, and physical principles of converting raw agricultural products into processed forms for human consumption and the storage of these products, human physiology and nutrition, food chemistry, agricultural products processing, food additives, food preparation and packaging, food storage and distribution, and related aspects of human health and safety including toxicology and pathology.

Listed below are the courses that comprise this program when offered at the secondary level:

OCCUPATIONAL COMPLETION POINT - DATA CODE A

Food Science Technicians - SOC Code - 19-4011.02

- 8106810 - Agriscience Foundations 1
- 8129210 - Food Science Applications 2
- 8129220 - Food Science Applications 3

- II. **LABORATORY ACTIVITIES:** Agriscience laboratory activities are an integral part of this program, which includes the safe use and application of laboratory equipment.
- III. **SPECIAL NOTE:** FFA is the appropriate Career Student Organization for providing leadership training and for reinforcing specific vocational skills. Career Student Organizations, when provided, shall be an integral part of the vocational instructional program, and the

activities of such organizations are defined as part of the curriculum in accordance with Rule 6A-6.065(8), FAC.

Planned and supervised occupational activities must be provided through one or more of the following: (1) directed laboratory experience, (2) student project, (3) placement for experience, and (4) cooperative education.

Cooperative training - OJT is appropriate for this program. Whenever cooperative training - OJT is offered, the following are required for each student: a training plan, signed by the student, teacher, and employer, which includes instructional objectives and a list of on-the-job and in-school learning experiences; a workstation that reflects equipment, skills, and tasks that are relevant to the occupation which the student has chosen as a career goal. The student must receive compensation for work performed.

Federal and state legislation requires the provision of accommodations for students with disabilities to meet individual needs and ensure equal access. Adult students with disabilities must self-identify and request such services. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

IV. INTENDED OUTCOMES: After successfully completing this program, the student will be able to:

Occupational Completion Point - DATA CODE A
Food Science Technicians - SOC Code - 19-4011.02

- 01.0 Describe the history of agriculture and its influence on the global economy.
- 02.0 Practice agriscience safety skills and procedures.
- 03.0 Apply scientific and technological principles to agriscience issues.
- 04.0 Apply environmental principles to the agricultural industry.
- 05.0 Investigate and utilize basic scientific skills and principles in plant science.
- 06.0 Investigate and utilize basic scientific skills and principles in animal science.
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments.
- 08.0 Demonstrate agribusiness, employability & human relation skills.
- 09.0 Apply leadership and citizenship skills.
- 10.0 Identify the impact of food preservation on the development of civilizations.
- 11.0 Identify the importance of raw agricultural products to the food science industry.
- 12.0 Analyze the components of the marketing chain.
- 13.0 Discuss food product distribution.
- 14.0 Discuss the role of regulatory agencies in the food industry.
- 15.0 Describe the economic and cultural impact of a global food market
- 16.0 Describe how proteins, carbohydrates, lipids, vitamins and minerals are digested and how food preparation impacts nutritional value and quality.
- 17.0 Describe the biological composition and processing of foods.
- 18.0 Describe the chemical composition and processing of foods.

- 19.0 Describe the physical composition and processing of foods.
- 20.0 Discuss environmental issues impacting the production and processing of foods.
- 21.0 Demonstrate leadership, employability, communications and human relations skills.
- 22.0 Write lab reports to record, interpret and evaluate data.
- 23.0 Explain the process of food product development.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Program Title: Food Science Applications
Secondary Number: 8129200
Postsecondary Number:

OCCUPATIONAL COMPLETION POINT - DATA CODE A

Food Science Technicians - SOC Code - 19-4011.02

- 01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:
 - 01.01 Investigate the history of agriculture and its relationship to science and technology.
 - 01.02 Analyze the impact of agriculture on the local, state, national and global economy.
 - 01.03 Identify significant career patterns/shifts in the history of the agricultural industry.
 - 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment.

- 02.0 Practice agriscience safety skills and procedures --The student will be able to:
 - 02.01 List the common causes of accidents in agriscience operations.
 - 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
 - 02.03 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, and Occupational Safety and Health Agency (OSHA) regulations.
 - 02.04 Identify proper disposal of hazardous waste materials and biohazards.
 - 02.05 Describe emergency procedures.

- 03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:
 - 03.01 Employ scientific measurement skills.
 - 03.02 Demonstrate safe and effective use of common laboratory equipment.
 - 03.03 Identify the parts and functions of plant and animal cells.
 - 03.04 Describe the phases of cell reproduction.
 - 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project.
 - 03.06 Interpret, analyze, and report data.
 - 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability.
 - 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.).

- 04.0 Apply environmental principles to the agricultural industry --The student will be able to:
 - 04.01 Determine how different climactic and geological activity influences agriculture.

- 04.02 Describe various ecosystems as they relate to the agriculture industry.
 - 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production.
 - 04.04 Identify regulatory agencies that impact agricultural practices.
 - 04.05 Apply Best Management Practices that enhance the natural environment.
 - 04.06 Identify conservation practices related to natural resources.
- 05.0 Investigate and utilize basic scientific skills and principles in plant science --The student will be able to:
- 05.01 Identify and describe the specializations within the plant science industry.
 - 05.02 Categorize plants based on specific characteristics according to industry and scientific standards.
 - 05.03 Examine the processes of plant growth including photosynthesis and respiration.
 - 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions.
 - 05.05 Analyze information from a fertilizer label.
 - 05.06 Propagate and grow plants through sexual and/or asexual reproduction.
 - 05.07 Investigate the impacts of various pests and propose solutions for their control.
 - 05.08 Investigate the nature and properties of food, fiber, and by-products from plants.
 - 05.09 Explore career opportunities in plant science.
- 06.0 Investigate and utilize basic scientific skills and principles in animal science --The student will be able to:
- 06.01 Investigate the origin, history, and domestication of animals.
 - 06.02 Explain the economic importance of animals and the products obtained from animals.
 - 06.03 Categorize animals according to use, type, breed, and scientific classification.
 - 06.04 Employ correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species.
 - 06.05 Compare basic internal & external anatomy of animals.
 - 06.06 Demonstrate approved practices in the management, health, safety, and technology of the animal industry.
 - 06.07 Discuss animal welfare issues.
 - 06.08 Investigate the nature and properties of food, fiber, and by-products from animals.
 - 06.09 Explore career opportunities in animal science.
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments --
The student will be able to:
- 07.01 Select and demonstrate the use of agriscience tools, equipment, and instruments.
 - 07.02 Describe various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion).
 - 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience.
 - 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies.
 - 07.05

- 08.0 Demonstrate agribusiness, employability & human relation skills --The student will be able to:
- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE).
 - 08.02 Utilize a record keeping system to collect, interpret, and analyze data.
 - 08.03 Enhance oral communications through telephone, interview and presentation skills.
 - 08.04 Enhance written communication by developing resumes and business letters.
 - 08.05 Demonstrate interpersonal (nonverbal) communication skills.
 - 08.06 Demonstrate good listening skills.
- 09.0 Apply leadership and citizenship skills--The student will be able to:
- 09.01 Identify and describe leadership characteristics.
 - 09.02 Identify opportunities to apply acquired leadership skills.
 - 09.03 Identify and demonstrate ways to be an active citizen.
 - 09.04 Participate in community based learning activities.
 - 09.05 Demonstrate the ability to work cooperatively.
 - 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills.
 - 09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations.
- 10.0 Identify the impact of food preservation on the development of civilizations--The student will be able to:
- 10.01 Describe and differentiate between the five phases of food history.
 - 10.02 Compare and contrast historical and modern methods of food preservation.
 - 10.03 Explain the impact of food and nutrition on the evolution of society.
 - 10.04 Analyze the influence of convenience food trends on society.
 - 10.05 Identify the origin of food products consumed in the United States.
- 11.0 Identify the importance of raw agricultural products in the food science industry--The student will be able to:
- 11.01 Identify wholesale plant, dairy, meat, poultry and aquatic animal food products.
 - 11.02 Analyze the factors that impact food grades and grading.
 - 11.03 Identify plant production practices that impact food product quality, quantity and consistency.
 - 11.04 Examine nutritional content of plant food products.
 - 11.05 Compare and contrast consumption trends of plant products in the United States.
 - 11.06 Compare the relative economic value of plant food products.
 - 11.07 Identify animal production practices that impact food product quality, quantity and consistency.
 - 11.08 Examine nutritional content of animal food products.
 - 11.09 Compare and contrast consumption trends of animal products in the United States.
 - 11.10 Compare the relative economic value of animal food products.

12.0 Analyze the components of the marketing chain--The student will be able to:

- 12.01 Identify the five features of food labels.
- 12.02 Explain USDA regulations regarding food labeling.
- 12.03 Design a food label.
- 12.04 Develop a food product logo and slogan.
- 12.05 Apply basic principles of advertisement
- 12.06 Design a print advertisement.
- 12.07 Develop a video or audio advertisement.
- 12.08 Explain how package design and size influence consumer acceptance.
- 12.09 Explore the relationship between value-added products and profitability.
- 12.10 Analyze the economic significance of converting raw products into value-added food products.
- 12.11 Discuss retail store layout and product placement.
- 12.12 Analyze retail-marketing strategies.

13.0 Discuss food product distribution--The student will be able to:

- 13.01 Explain the impact of transportation on food cost and availability.
- 13.02 Determine the relationship between transportation and packaging needs.
- 13.03 Compare modes of food product transportation.
- 13.04 Describe the various levels of the food distribution chain.
- 13.05 Analyze the factors that influence profit at various levels of the distribution chain.
- 13.06 Describe the challenges associated with distributing perishable products.

14.0 Discuss the role of regulatory agencies in the food industry--The student will be able to:

- 14.01 Describe the basic requirements of *Hazard Analysis and Critical Control Points* (HAACP) in food processing.
- 14.02 Identify food safety regulatory agencies.
- 14.03 Examine the chemical, physical and biological categories of food safety and sanitation.
- 14.04 Discuss the role of sanitation during food processing.
- 14.05 Describe regulations governing the food industry and how they are enforced.
- 14.06 Describe the importance of self-regulation in controlling food quality and safety.
- 14.07 Describe and analyze agro terrorism.
- 14.08 Identify and describe food pathogens, allergens and food borne illnesses.
- 14.09 Evaluate the food safety responsibilities that occur along the food supply chain.
- 14.10 Explore the health risks associated with pathogens, allergens and food borne illnesses.
- 14.11 Apply basic principles of safe food handling.

15.0 Describe the economic and cultural impact of a global food market--The student will be able to:

- 15.01 Analyze the influence of culture on American food preferences.
- 15.02 Analyze national and international food preferences on food production in the United States.

- 15.03 Explain the political nature of the world's food supply.
 - 15.04 Explain the relationships between global population growth and the food supply.
 - 15.05 Discuss possible causes of world hunger.
 - 15.06 Explore the economic and political impact of international trade.
 - 15.07 Examine the impact of the global food supply on national security.
 - 15.08 Explore the relationship between point of origin laws for imports and major national customers for exports.
 - 15.09 Compare safety and environmental regulations between nations and methods of enforcing compliance.
- 16.0 Describe how proteins, carbohydrates, lipids, vitamins and minerals are digested and how food preparation impacts nutritional value and quality--The student will be able to:
- 16.01 Discuss the functions of carbohydrates, fats, proteins, minerals, vitamins, water and caloric needs in the body.
 - 16.02 Compare and contrast food sources of carbohydrates, fats, proteins, minerals, vitamins, water and caloric needs in the body
 - 16.03 Identify the effects of preparation methods on nutritional content and food quality.
 - 16.04 Conduct experiments that examine the chemical processes involved in digestion of carbohydrates, proteins, fats, vitamins and minerals.
 - 16.05 Describe the cellular process involved in assimilating carbohydrates, proteins, fats, vitamins and minerals
 - 16.06 Analyze the role of enzymes in digestion.
 - 16.07 Examine the relationship between water and nutrient absorption.
- 17.0 Describe the biological composition and processing of foods--The student will be able to:
- 17.01 Explain microbiology and its application to food processing.
 - 17.02 Describe the effects of microbes on food spoilage.
 - 17.03 Recognize characteristics of spoiled food.
 - 17.04 Apply the principles of managing Food, Acid, Time, Temperature, Oxygen, and Moisture (FATTOM) in controlling food spoilage.
 - 17.05 Test the effects of yeasts, bacteria, molds and enzymes in food processing.
- 18.0 Describe the chemical composition and processing of foods--The student will be able to:
- 18.01 Explain the use of color in food processing.
 - 18.02 Explain the use of flavor in food processing.
 - 18.03 Explain the use of preservatives in food processing.
 - 18.04 Explain the use of textural agents in food processing.
 - 18.05 Examine methods of manipulating color and ripeness of fresh produce.
 - 18.06 Analyze the molecular structure of carbohydrates.
 - 18.07 Analyze the molecular structure of fats.
 - 18.08 Analyze the molecular structure of proteins.
 - 18.09 Explain the concepts of pH and buffers as they relate to foods.
 - 18.10 Examine the effects of processing and preparation on the chemical composition of foods.
 - 18.11 Explain the use of proteins, fats and carbohydrates.

- 19.0 Describe the physical composition and processing of foods--The student will be able to:
- 19.01 Describe materials handling in the food industry.
 - 19.02 Describe factors and processes related to heat transfer.
 - 19.03 Compare and contrast methods of moisture content manipulations.
 - 19.04 Examine techniques used in producing formed foods.
 - 19.05 Examine methods for separating food products.
 - 19.06 Analyze factors related to product mixing.
 - 19.07 Analyze mechanical factors influencing product preparation.
 - 19.08 Compare processing methods used to enhance shelf life of fresh produce.
- 20.0 Discuss environmental issues impacting the production and processing of foods--The student will be able to:
- 20.01 Explain how water used during production impacts the cost of food products.
 - 20.02 Describe the impact of pesticides on food production, processing, quality and safety.
 - 20.03 Describe the impact of *Best Management Practices* (BMP) and Good Agricultural Practices on food production, processing, quality and safety.
 - 20.04 Describe the impact of Genetically Modified Organisms (GMO) on food production, processing, quality and safety
 - 20.05 Describe the requirements of water used in food processing.
 - 20.06 Discuss methods used in food processing for disposing of solid wastes.
 - 20.07 Compare and contrast methods of wastewater management used in food processing.
- 21.0 Demonstrate leadership, employability, communications and human relations skills--The student will be able to:
- 21.01 Investigate career opportunities in the food industry and identify educational experiences necessary to prepare for those careers.
 - 21.02 Conduct group meetings using parliamentary procedure and public speaking skills.
 - 21.03 Correctly follow oral and written directions and ask questions that clarify directions, as needed.
 - 21.04 Communicate effectively in verbal, written, and nonverbal modes.
 - 21.05 Recognize and demonstrate good listening skills.
 - 21.06 Identify the opportunities for leadership development available through an appropriate student and/or professional organization.
 - 21.07 Identify acceptable work habits and personal characteristics.
 - 21.08 Identify acceptable employee hygiene habits.
 - 21.09 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons.
 - 21.10 Describe the importance of industry certifications.
 - 21.11 Conduct small informal and formal group meetings.
- 22.0 Write lab reports to record, interpret and evaluate data--The student will be able to:
- 22.01 Explain the importance of scientific exploration of food.
 - 22.02 Identify and use the basic units of the metric system of measurement.
 - 22.03 Demonstrate effective manipulation of scientific materials and equipment in the food science laboratory.

- 22.04 Practice the expected safety procedures and care while working in the food science laboratory.
 - 22.05 Apply the steps of the scientific methods.
 - 22.06 Design and write reports of food science laboratory experiments including mathematical and statistical examples for evaluation of collected data.
- 23.0 Explain the process of food product development--The student will be able to:
- 23.01 Explain how ideas for new products are developed.
 - 23.02 Describe new product development procedures.
 - 23.03 Explain consumer response tests.
 - 23.04 Explain the role of test marketing with new products.
 - 23.05 Explain sensory analysis.
 - 23.06 Compare the categories of sensory properties.
 - 23.07 Assess why the food industry conducts sensory testing.
 - 23.08 Develop a new food product.
 - 23.09 Conduct and analyze a food market test
 - 23.10 Apply sensory analysis techniques.
 - 23.11 Conduct a cost analysis for a new food product.

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8106810
Course Title: Agriscience Foundations I
Course Credit: 1

COURSE DESCRIPTION:

This course is designed to develop competencies in the areas of agricultural history and the global impact of agriculture; career opportunities; scientific and research concepts; biological and physical science principles; environmental principles; agriscience safety; principles of leadership; and agribusiness, employability, and human relations skills in agriscience. Laboratory-based activities are an integral part of this course. These include the safe use and application of appropriate technology, scientific testing and observation equipment.

01.0 Describe the history of agriculture and its influence on the global economy--The student will be able to:

- 01.01 Investigate the history of agriculture and its relationship to science and technology. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SS.A.1.4.1, 4; SS.A.2.4.1, 2; SS.A.3.4.1, 5, 8; SS.A.3.4.9; SS.A.5.4.1; SS.B.1.4.1, 4; SC.H.3.4.2, 3, 5, 6; SC.D.1.4.3, 4
- 01.02 Analyze the impact of agriculture on the local, state, national and global economy. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; MA.A.2.4.1, 2; MA.A.3.4.1, 3; MA.E.1.4.1, 2; SS.A.3.4.3, 8, 10; SS.A.4.4.1, 6; SS.A.5.4.3, 5; SS.B.2.4.1, 4; SC.H.3.4.2, 3, 5, 6; SC.B.1.4.5; SC.D.1.4.1, 3; SC.D.2.4.1
- 01.03 Identify significant career patterns/shifts in the history of the agricultural industry. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SS.A.1.4.1; SS.A.3.4.5; SS.A.5.4.2; SS.B.2.4.4; SC.H.3.4.2, 3, 5, 6; SC.B.1.4.5; SC.D.1.4.1, 3; SC.D.1.4.4; SC.H.1.4.2
- 01.04 Examine the role of the agricultural industry in the interaction of population, food, energy, and the environment. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; MA.D.1.4.1; MA.D.2.4.1; MA.E.1.4.1; SS.A.4.4.1, 2; S.A.5.4.1, 2; SS.B.1.4.4; SS.B.2.4.1; SS.B.2.4.2, 4, 6; SS.D.1.4.1; SC.H.3.4.2, 3, 5, 6; SC.B.1.4.5; SC.D.1.4.1, 3, 4; SC.D.2.4.1; SC.G.2.4.6

02.0 Practice agriscience safety skills and procedures --The student will be able to:

- 02.01 List the common causes of accidents in agriscience operations. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1
- 02.02 Demonstrate proper safety precautions and use of personal protective equipment.
- 02.03 Extract and utilize pertinent information from a container label and/or Material Safety Data Sheet (MSDS) following Environmental Protection Agency (EPA), Worker Protection Standard, and Occupational Safety and Health Agency (OSHA) regulations. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; MA.A.1.4.1; MA.A.3.4.1; MA.B.1.4.1, 2; MA.B.2.4.2; MA.B.3.4.1; MA.B.4.4.1, 2; MA.E.1.4.1

- 02.04 Identify proper disposal of hazardous waste materials and biohazards. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1
- 02.05 Describe emergency procedures. LA.C.3.4.1; LA.C.3.4.2; LA.C.3.4.3
- 03.0 Apply scientific and technological principles to agriscience issues--The student will be able to:
- 03.01 Employ scientific measurement skills. MA.A.1.4.1; MA.A.2.4.2; MA.B.2.4.1, 2; MA.B.4.4.1; SC.B.1.4.3; SC.H.1.4.1
- 03.02 Demonstrate safe and effective use of common laboratory equipment. SC.H.1.4.1
- 03.03 Identify the parts and functions of plant and animal cells. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SC.B.1.4.1, 2; SC.F.1.4.1, 2, 3, 7, 8; SC.F.2.4.1
- 03.04 Describe the phases of cell reproduction. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SC.B.1.4.1, 2; SC.F.1.4.1, 2, 3, 7, 8; SC.F.2.4.1; SC.G.1.4.1
- 03.05 Implement the scientific method and science process skills through the design and completion of an agriscience research project. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; MA.E.3.4.1, 2; SC.H.1.4.1, 2, 3; SC.H.2.4.1, 2
- 03.06 Interpret, analyze, and report data. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; MA.E.1.4.1, 2, 3; MA.E.2.4.1, 2; SC.B.1.4.3, SC.H.1.4.1, 2, 3, 4, 7
- 03.07 Investigate DNA and genetics applications in agriscience including the theory of probability. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; MA.E.2.4.1, 2; SC.F.2.4.2, 3; SC.G.2.4.3
- 03.08 Evaluate advances in biotechnology that impact agriculture (e.g. transgenic crops, biological controls, etc.). LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SC.F.2.4.2, 3; SC.G.2.4.3
- 04.0 Apply environmental principles to the agricultural industry --The student will be able to:
- 04.01 Determine how different climactic and geological activity influences agriculture. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SS.B.1.4.1; SS.B.2.4.4; SC.B.1.4.5; SC.D.1.4.1, 2, 3; SC.D.2.4.1; SC.G.1.4.1
- 04.02 Describe various ecosystems as they relate to the agriculture industry. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SC.B.1.4.1, 2; SC.D.1.4.1, 2, 3; SC.D.2.4.1; SC.G.1.4.1; SC.G.2.4.2, 4; SC.G.2.4.5, 6
- 04.03 Describe the environmental resources (soil, water, air) necessary for agriculture production. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SS.B.2.4.1, 6; SC.B.1.4.1, 2, 5; SC.D.1.4.1, 2, 3; SC.D.2.4.1; SC.G.1.4.1; SC.G.2.4.2, 4, 5, 6
- 04.04 Identify regulatory agencies that impact agricultural practices. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SC.B.1.4.5; SC.D.1.4.1, 2, 3; SC.D.2.4.1; SC.G.1.4.1; SC.G.2.4.2, 4; SC.G.2.4.5, 6
- 04.05 Apply Best Management Practices that enhance the natural environment. SC.B.1.4.5; SC.D.1.4.1, 2, 3; SC.D.2.4.1; SC.G.1.4.1; SC.G.2.4.2, 4, 5, 6
- 04.06 Identify conservation practices related to natural resources. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SC.B.1.4.1, 2, 5; SC.D.1.4.1, 2, 3; SC.D.2.4.1; SC.G.1.4.1; SC.G.2.4.2, 3, 4, 5, 6

05.0 Investigate and utilize basic scientific skills and principles in plant science --The student will be able to:

- 05.01 Identify and describe the specializations within the plant science industry. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1
- 05.02 Categorize plants based on specific characteristics according to industry and scientific standards. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SC.G.1.4.1
- 05.03 Examine the processes of plant growth including photosynthesis and respiration. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SC.B.1.4.1, 2; SC.D.1.4.1; SC.F.1.4.1, 2, 3, 7, 8; SC.G.2.4.2
- 05.04 Identify the nutrients required for plant growth from the periodic table and explain their functions. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SC.D.1.4.1, 2; SC.F.1.4.1, 2, 3, 7, 8; SC.G.2.4.2
- 05.05 Analyze information from a fertilizer label. MA.E.1.4.1; MA.B.1.4.1, 2; MA.B.2.4.1, 2; MA.B.3.4.1; MA.B.4.4.1, 2; SC.A.2.4.5
- 05.06 Propagate and grow plants through sexual and/or asexual reproduction. SC.B.1.4.1, 2; SC.D.1.4.1, 2; SC.F.1.4.1, 2, 3, 7, 8; SC.F.2.4.1, 3; SC.G.2.4.3
- 05.07 Investigate the impacts of various pests and propose solutions for their control. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SC.B.1.4.1, 2; SC.D.1.4.1; SC.F.1.4.1, 2, 3, 7, 8; SC.G.1.4.1; SC.G.2.4.2
- 05.08 Investigate the nature and properties of food, fiber, and by-products from plants. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SC.B.1.4.1, 2, 3; SC.F.1.4.1, 2, 3, 7, 8; SC.G.1.4.1
- 05.09 Explore career opportunities in plant science. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1

06.0 Investigate and utilize basic scientific skills and principles in animal science --The student will be able to:

- 06.01 Investigate the origin, history, and domestication of animals. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SC.D.1.4.3, 4; SC.G.1.4.1
- 06.02 Explain the economic importance of animals and the products obtained from animals. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; MA.D.1.4.1; MA.E.1.4.1; MA.A.1.4.1, 2, 3, 4; MA.A.2.4.2; SC.D.1.4.1; SC.G.1.4.1
- 06.03 Categorize animals according to use, type, breed, and scientific classification. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SC.G.1.4.1
- 06.04 Employ correct terminologies for animal species and conditions (e.g. age, sex, etc.) within those species. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1
- 06.05 Compare basic internal & external anatomy of animals. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SC.F.1.4.1, 2, 3, 7, 8; SC.F.2.4.1
- 06.06 Demonstrate approved practices in the management, health, safety, and technology of the animal industry. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SC.B.1.4.1, 2; SC.D.1.4.1; SC.F.1.4.1, 2, 3, 7, 8; SC.F.2.4.1, 3; SC.G.1.4.1; SC.G.2.4.2, 3
- 06.07 Discuss animal welfare issues. LA.C.3.4.1; LA.C.3.4.2; LA.C.3.4.3; SC.D.1.4.1

- 06.08 Investigate the nature and properties of food, fiber, and by-products from animals. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SC.B.1.4.1, 2; SC.B.1.4.3; SC.F.1.4.1, 2, 3, 7, 8; SC.G.1.4.1
- 06.09 Explore career opportunities in animal science. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1
- 07.0 Demonstrate the use of agriscience tools, equipment, and instruments --
The student will be able to:
- 07.01 Select and demonstrate the use of agriscience tools, equipment, and instruments. MA.A.1.4.1, 4; MA.B.1.4.1, 2, 3; MA.B.2.4.1; MA.B.1.4.2; MA.B.4.4.1, 2; SC.B.1.4.1, 2
- 07.02 Describe various physical science principles as applied in selected mechanical applications (e.g. levers, pulleys, hydraulics, and internal combustion). LA.A.1.4.1; LA.A.1.4.2; LA.A.1.4.3; LA.A.1.4.4; MA.B.1.4.1, 2, 3; MA.B.2.4.1, 2; MA.B.3.4.1; MA.B.4.4.1, 2; SC.B.1.4.1, 2, 3; SC.C.2.4.6
- 07.03 Solve time, distance, area, volume, ratio, proportion, and percentage problems in agriscience. SC.B.1.4.1, 2, 3
- 07.04 Service and maintain agriscience equipment, instruments, facilities, and supplies. LA.A.1.4.1; LA.A.1.4.2; LA.A.1.4.3; LA.A.1.4.4; SC.B.1.4.1, 2
- 08.0 Demonstrate agribusiness, employability & human relation skills --The student will be able to:
- 08.01 Develop, implement, and maintain work based learning through Supervised Agricultural Experiences (SAE). LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1
- 08.02 Utilize a record keeping system to collect, interpret, and analyze data. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; MA.B.2.4.1; MA.B.3.4.1; MA.B.4.4.2; MA.E.1.4.1; SC SC.H.1.4.7, SC.H.3.4.3
- 08.03 Enhance oral communications through telephone, interview and presentation skills. LA.C.1.4.3; LA.C.3.4.1; LA.C.3.4.2; LA.C.3.4.3; LA.C.3.4.4; LA.C.3.4.5; SC.H.1.4.7
- 08.04 Enhance written communication by developing resumes and business letters. LA.B.1.4.1; LA.B.1.4.2; LA.B.1.4.3; LA.B.2.4.1; LA.B.2.4.2; LA.B.2.4.3; SC.H.1.4.7
- 08.05 Demonstrate interpersonal (nonverbal) communication skills. LA.C.3.4.1; LA.C.3.4.2; LA.C.3.4.3; LA.C.3.4.4; LA.C.3.4.5
- 08.06 Demonstrate good listening skills. LA.C.1.4.1; LA.C.1.4.2; LA.C.1.4.3; LA.C.1.4.4
- 09.0 Apply leadership and citizenship skills --The student will be able to:
- 09.01 Identify and describe leadership characteristics. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1
- 09.02 Identify opportunities to apply acquired leadership skills. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1
- 09.03 Identify and demonstrate ways to be an active citizen. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1; SC.H.1.4.7
- 09.04 Participate in community based learning activities. SC.H.1.4.7
- 09.05 Demonstrate the ability to work cooperatively. SC.H.1.4.4
- 09.06 Conduct formal and informal meetings using correct parliamentary procedure skills. LA.C.3.4.1; LA.C.3.4.2; LA.C.3.4.3; SC.H.1.4.7

09.07 Identify the opportunities for leadership development available through the National FFA Organization and/or professional organizations. LA.A.1.4.1, 2, 3, 4; LA.A.2.4.4; LA.B.1.4.1, 2, 3; LA.B.2.4.1, 2, 3; LA.C.1.4.1; LA.C.2.4.1

Florida Department of Education
STUDENT PERFORMANCE STANDARDS

Course Number: 8129210
Course Title: Food Science Applications 2
Course Credit: 1

COURSE DESCRIPTION:

This course is designed to develop competencies in the concepts related to: the use of taste and other sensory tests in developing foods; the application of scientific principles in food processing; food marketing; nutritional and economic value of plant-based food products; safe and efficient distribution and handling of food products; environmental factors in food production and processing; the global and historical impact of food on people; and employability skills necessary in the food industry.

10.0 Identify the impact of food preservation on the development of civilizations--The student will be able to:

- 10.01 Describe and differentiate between the five phases of food history. LA.A.1.4, 2.4; LA.C.1.4; LA.E.2.4; SC.H.3.4; SS.A.1.4, 2.4, 3.4, 4.4, 5.4; SS.B.2.4
- 10.02 Compare and contrast historical and modern methods of food preservation. LA.A.1.4, 2.4; LA.C.1.4; LA.E.2.4; MA.A.5.4; MA.B.1.4; MA.D.1.4; MA.E.3.4; SC.H.3.4, SC.B.1.4; SS.A.1.4, 2.4, 3.4, 4.4, 5.4; SS,B,2.4
- 10.03 Explain the impact of food and nutrition on the evolution of society. LA.A.1.4, 2.4; LA.D.1.4, 2.4; SC.H.3.4, SC.D.1.4; SS.B.2.4
- 10.04 Analyze the influence of convenience food trends on society. LA.A.1.4, 2.4; LA.C.1.4, 2.4; MA.A.3.4; MA.B.2.4; MA.E.1.4, 2.4, 3.4; SC.H.3.4, SC.H.1.4; SS.B.2.4; SS.D.4
- 10.05 Identify the origins of food products commonly consumed in the United States. LA.A.1.4, 2.4; LA.C.1.4; SC.G.2.4; SS.B.2.4; SS.B.1.4; SS.D.2.4

11.0 Identify the importance of raw agricultural products in the food science industry--The student will be able to:

- 11.01 Identify wholesale plant, dairy, meat, poultry and aquatic animal food products. LA.A.1.4, 2.4; LA.C.1.4; SC.F.1.4, SC.G.1.4
- 11.02 Analyze the factors that impact food grades and grading. LA.A.1.4, 2.4; LA.C.1.4
- 11.03 Identify plant production practices that impact food product quality, quantity and consistency. LA.A.1.4, 2.4; LA.B.1.4, 2.4;
- 11.04 Examine nutritional content of plant food products. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; MA.A.3.4; MA.B.2.4, 3.4, 4.4; SC.A.1.4, SC.A.2.4, SC.F.1.4
- 11.05 Compare and contrast consumption trends of plant products in the United States. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; MA.D.1.4, 2.4; MA.E.1.4, 2.4, 3.4; SS.B.1.4
- 11.06 Compare the relative economic value of plant food products. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; MA.E.1.4, 2.4, 3.4; SS.D.1.4, 2.4

12.0 Analyze the components of the marketing chain--The student will be able to:

- 12.01 Identify the five features of food labels. LA.A.1.4, 2.4; LA.B.1.4; MA.B.2.4, 3.4; SC.H.3.4
- 12.02 Identify USDA regulations regarding food labeling. LA.A.1.4, 2.4; LA.C.1.4; MA.B.3.4; MA.E.3.4; SC.H.3.4; SS.C.1.4; SS.D.2.4
- 12.03 Design a food label. LA.A.1.4, 2.4; LA.B.2.4; LA.C.1.4, 2.4, 3.4; MA.A.2.4; MA.C.2.4, 3.4
- 12.04 Develop a food product logo and slogan. LA.A.1.4, 2.4; LA.B.2.4; LA.C.1.4, 2.4, 3.4
- 12.05 Apply basic principles of advertisement LA.A.1.4, 2.4; LA.B.1.4, 2.4, 3.4
- 12.06 Design a print advertisement. LA.A.1.4, 2.4; LA.B.2.1.4, 2.4
- 12.07 Develop a video or audio advertisement. LA.C.1.4, 2.4, 3.4

13.0 Discuss food production distribution--the student will be able to:

- 13.01 Explain the impact of transportation on food cost and availability. LA.A.1.4, 2.4; LA.C.1.4; MA.A.1.4, 2.4, 4.4; MA.B.1.4, 3.4, 4.4; MA.E.1.4, 2.4, 3.4; SC.H.1.4, SC.H.3.4, SC.B.1.4, SC.B.2.4; SS.D.2.4
- 13.02 Determine the relationship between transportation and packaging needs. LA.A.1.4, 2.4; LA.C.1.4; MA.A.1.4, 2.4, 4.4; MA.B.1.4, 3.4, 4.4; MA.E.1.4, 2.4, 3.4; SC.H.1.4, SC.H.3.4, SC.A.1.4
- 13.03 Compare modes of food product transportation. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4; MA.A.1.4, 2.4, 4.4; MA.B.1.4, 3.4, 4.4; MA.E.1.4, 2.4, 3.4; SC.H.1.4, SC.H.3.4
- 13.04 Describe the various levels of the food distribution chain. LA.A.1.4, 2.4; LA.C.1.4; MA.B.1.4; MA.E.3.4
- 13.05 Analyze the factors that influence profit at various levels of the distribution chain. LA.A.1.4, 2.4, LA.B.1.4; LA.C.1.4; MA.A.2.4, 4.4; MA.B.1.4, 3.4; MA.E.1.4, 2.4, 3.4; SS.D.2.4
- 13.06 Describe the challenges associated with distributing perishable products. LA.A.1.4, 2.4, LA.B.1.4, 2.4; LA.C.1.4; MA.A.3.4; MA.E.1.4, 2.4, 3.4; SC.B.1.4, SC.B.2.4, SC.F.1.4, SC.H.1.4, SC.H.2.4, SC.H.3.4

140 Discuss the role of regulatory agencies in the food industry--The student will be able to:

- 14.01 Describe the basic requirements of Hazard Analysis and Critical Control Points (HAACP) in food processing. LA.A.1.4, 2.4, LA.B.1.4; LA.C.1.4; SC.H.1.4, SC.H.2.4, SC.H.3.4, SC.D.2.4; SS.C.1.4
- 14.02 Identify food safety regulatory agencies. LA.A.1.4, 2.4; A.B.1.4, 2.4; LA.C.1.4; SS.C.1.4
- 14.03 Examine the chemical, physical and biological categories of food safety and sanitation. LA.A.1.4, 2.4; LA.C.1.4; MA.A.3.4, 4.4, 5.4; MA.B.2.4; SC.H.1.4, SC.H.2.4, SC.H.3.4, SC.A.1.4, SC.A.1.4, SC.D.2.4, SC.F.1.4, SC.F.2.4
- 14.04 Discuss the role of sanitation during food processing. LA.A.1.4, 2.4; LA.C.1.4; SC.F.1.4, SC.H.1.4, SC.H.3.4
- 14.05 Describe regulations governing the food industry and how they are enforced. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4; SS.C.1.4
- 14.06 Describe the importance of self-regulation in controlling food quality and safety. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4; SC.A.2.4; SC.B.1.4, 2.4; SC.C.1.4; SC.D.2.4

- 15.0 Describe the economic and cultural impact of a global food market--The student will be able to:
- 15.01 Analyze the influence of culture on American food preferences. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; LA.D.1.4, 2.4; MA.E.1.4, 2.4; SS.A.1.4
 - 15.02 Analyze national and international food preferences on food production in the United States. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; LA.D.1.4, 2.4; MA.D.1.4, 2.4; MA.E.1.4, 2.4
 - 15.03 Explain the political nature of the world's food supply. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; LA.D.1.4, 2.4; MA.E.1.4, 2.4, 3.4; SC.G.2.4, SC.H.3.4; SS.C.1.4; SS.D.2.4
 - 15.04 Explain the relationships between global population growth and food supply needs. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; LA.D.1.4, 2.4; MA.D.1.4, 2.4; MA.E.1.4, 2.4; SC.G.1.4, SC.G.2.4, SC.H.3.4, SC.D.2.4; SS.D.2.4
 - 15.05 Discuss possible causes of world hunger. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; LA.D.1.4, 2.4; SC.G.1.4, SC.G.2.4, SC.D.2.4; SS.D.1.4
- 16.0 Describe how proteins, carbohydrates, lipids, vitamins, and minerals are digested and how food preparation impacts nutritional value and quality--The student will be able to:
- 16.01 Discuss the functions of carbohydrates, fats, proteins, minerals, vitamins, water and caloric needs in the body. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; MA.A.2.4; MA.B.2.4, 3.4; SC.A.2.4, SC.B.1.4, SC.G.1.4, SC.F.1.4
 - 16.02 Compare and contrast food sources of carbohydrates, fats, proteins, minerals, vitamins, water and caloric needs in the body. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; MA.D.2.4; MA.E.1.4, 3.4; SC.A.2.4, SC.B.1.4, SC.F.1.4, SC.G.1.4
 - 16.03 Identify the effects of preparation methods on nutritional content and food quality. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; SC.A.2.4, SC.B.1.4, SC.F.1.4, SC.H.1.4, SC.H.3.4
- 17.0 Describe the biological composition and processing of foods--The student will be able to:
- 17.01 Explain microbiology and its application to food processing. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; SC.F.1.4; SC.F.2.4; SC.H.3.4
 - 17.02 Describe the effects of microbes on food spoilage. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; SC.F.1.4, SC.F.2.4
- 18.0 Describe the chemical composition and processing of foods--The student will be able to:
- 18.01 Explain the use of color in food processing. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4; SC.H.1.4, SC.H.3.4, SC.A.2.4, SC.H.3.4
 - 18.02 Explain the use of flavor in food processing. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4; SC.F.1.4, SC.F.2.4, SC.H.3.4, SC.B.2.4
 - 18.03 Explain the use of preservatives in food processing. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4; SC.A.2.4, SC.H.3.4
 - 18.04 Explain the use of textural agents in food processing. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4; SC.A.2.4, SC.H.3.4, SC.A.1.4

- 18.05 Examine methods of manipulating color and ripeness of fresh produce. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; SC.H.3.4, SC.A.1.4, SC.F.1.4, SC.B.2.4
- 19.0 Describe the physical composition and processing of foods--The student will be able to:
- 19.01 Describe materials handling in the food industry. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; SC.B.1.4, SC.C.1.4, SC.C.2.4
- 19.02 Describe factors and processes related to heat transfer. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; MA.A.3.4, 5.4; MA.B.1.4, 2.4, 4.4; SC.A.1.4, SC.B.1.4
- 19.03 Compare and contrast methods of moisture content manipulations. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; MA.A.3.4 MA.D.1.4, 2.4; MA.E.1.4, 2.4, 3.4; SC.B.2.4
- 19.04 Examine techniques used in producing formed foods. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; SC.C.1.4
- 20.0 Discuss environmental issues impacting the production and processing of foods--The student will be able to:
- 20.01 Explain how water is used during production impacts the cost of food products. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; MA.B.1.4; MA.E.1.4, 2.4, 3.4; SC.C.1.4
- 20.02 Describe the impact of pesticides on food production, processing, quality and safety. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; SC.D.2.4, SC.F.1.4, SC.G.1.4, SC.H.1.4, SC.H.3.4
- 20.03 Describe the impact of Best Management Practices (BMPs) and Good Agricultural Practices on food production, processing, quality and safety. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4
- 19.04 Describe the impact of Genetically Modified Organisms (GMOs) on food production, processing, quality and safety LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4;
- 21.0 Demonstrate leadership, employability, communications and human relations skills--The student will be able to:
- 21.01 Investigate career opportunities in the food industry and identify educational experiences necessary to prepare for those careers. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; LA.D.1.4, 2.4; LA.E.1.4, 2.4; SS.C.1.4
- 21.02 Conduct group meetings using parliamentary procedure and public speaking skills. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; LA.D.1.4, 2.4; LA.E.1.4, 2.4; SS.A.5.4; SS.B.2.4, SS.C.1.4, 2.4
- 21.03 Correctly follow oral and written directions and ask questions that clarify directions, as needed. LA.C.1.4, 2.4, 3.4; LA.D.1.4, 2.4
- 21.04 Communicate effectively in verbal, written, and nonverbal modes. LA.C.1.4, 2.4, 3.4
- 21.05 Recognize and demonstrate good listening skills. LA.C.1.4
- 21.06 Identify the opportunities for leadership development available through an appropriate student and/or professional organization. LA.C.1.4, 2.4, 3.4; SS.C.1.4, 2.4
- 22.0 Write lab reports to record, interpret and evaluate data.
- 22.01 Explain the importance of scientific exploration of food. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; SC.H.1.4 SC.H.2.4 SC.H.3.4

- 22.02 Identify and use the basic units of the metric system of measurement. LA.A.1.4, 2.4; LA.B.1.4, 2.4; MA.A.1.4; MA.A.2.4; MA.B.4.4
 - 22.03 Demonstrate effective manipulation of scientific materials and equipment in the food science laboratory. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, MA.A.3.4; MA.B.4.4; MA.E.1.4, 2.4, 3.4; SC.H.1.4
 - 22.04 Practice the expected safety procedures and care while working in the food science laboratory. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4; SC.H.1.4, SC.H.3.4
- 23.0 Explain the process of food product development—the student will be able to:
- 23.01 Explain how ideas for new products are developed. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; SC.A.1.4
 - 23.02 Describe new product development procedures. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; SC.A.1.4, SC.H.3.4
 - 23.03 Explain consumer response tests. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; LA.D.1.4, 2.4; MA.E.1.4, 2.4, 3.4; SC.H.3.4
 - 23.04 Explain the role of test marketing with new products. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; LA.D.1.4, 2.4; MA.E.1.4, 2.4, 3.4; SC.H.3.4
 - 23.05 Explain sensory analysis LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; LA.D.1.4, 2.4; MA.E.1.4, 2.4, 3.4; SC.F.1.4, SC.F.2.4, SC.H.3.4
 - 23.06 Compare the categories of sensory properties. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; SC.F.1.4
 - 23.07 Assess why the food industry conducts sensory testing. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; LA.D.1.4, 2.4

**Florida Department of Education
STUDENT PERFORMANCE STANDARDS**

Course Number: 8129220
Course Title: Food Science Applications 3
Course Credit: 1

COURSE DESCRIPTION:

This course is designed to develop competencies the food industry. The course addresses concepts related to: developing new food products; scientific experimentation with the chemical and biological components of foods; the impact of microbes in food production; the nutritional and economic value of animal-based food products; food spoilage and waste management; safety and security risks in the food supply; the international trade of foods; and employability skills necessary in the food industry.

11.0 Identify the importance of raw agricultural products in the food science industry--The student will be able to:

- 11.07 Identify animal production practices that impact food product quality, quantity and consistency. LA.A.1.4, 2.4; LA.C.1.4; MA.B.2.4, 4.4; MA.D.1.4; MA.E.2.4; SC.F.1.4, SC.G.1.4, SC.G.2.4
- 11.08 Examine nutritional content of animal food products. MA.A.1.4; MA.B.2.4; MA.E.1.4, 2.4, 3.4; SC.F.1.4
- 11.09 Compare and contrast consumption trends of animal products in the United States. LA.A.1.4, 2.4; LA.C.1.4; MA.A.3.4, 4.4; MA.D.1.4, 2.4; MA.E.1.4, 2.4, 3.4; SS.B.1.4, 2.4; SS.D.1.4, 2.4
- 11.10 Compare the relative economic value of animal food products. LA.A.1.4, 2.4; LA.C.1.4; MA.A.1.4, 4.4; MA.B.2.4; MA.E.1.4, 2.4, 3.4

12.0 Analyze the components of the marketing chain--The student will be able to:

- 12.08 Explain how package design and size influence consumer acceptance. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.2.4; LA.D.2.4; LA.E.2.4; MA.C.1.4, 2.4, 3.4; SC.H.3.4
- 12.09 Explore the relationship between value-added products and profitability. LA.A.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; MA.A.1.4, 3.4
- 12.10 Analyze the economic significance of converting raw products into value-added food products. LA.A.1.4, 2.4, LA.B.1.4, 2.4
- 12.11 Discuss retail store layout and product placement. LA.A.1.4, 2.4; LA.B.1.4; LA.C.2.4, 3.4; MA.C.1.4, 2.4, 3.4
- 12.12 Analyze retail-marketing strategies. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.2.4; MA.E.1.4, 2.4, 3.4; SS.D.2.4

14.0 Discuss the role of regulatory agencies in the food industry--The student will be able to:

- 14.07 Describe and analyze agro terrorism. LA.C.3.4; LA.D.1.4, 2.4; MA.E.1.4, 2.4
- 14.08 Identify and describe major food pathogens, allergens and food borne illnesses. LA.A.1.4, 2.4; SC.F.1.4, SC.G.1.4, SC.H.3.4
- 14.09 Evaluate the food safety responsibilities that occur along the food supply chain. LA.D.1.4

- 14.10 Explore the health risks associated with pathogens, allergens and food Bourne illnesses. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; MA.E.2.4; SC.F.1.4, SC.G.1.4
- 14.11 Apply basic principles of safe food handling. LA.C.1.4, 2.4; SC.F.1.4, SC.G.1.4
- 15.0 Describe the economic and cultural impact of a global food market.
- 15.06 Explore the economic and political impact of international trade. LA.D.1.4, 2.4; MA.D.1.4, 2.4; MA.E.1.4, 2.4, 3.4; SS.B.1.4, 2.4; SS.D.2.4
- 15.07 Examine the impact of the global food supply on national security. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4; LA.D.1.4, 2.4; MA.E.1.4, 2.4, 3.4; SS.B.1.4, 2.4; SS.D.2.4
- 15.08 Explore the relationship between point of origin laws for imports and major national customers for exports. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4; LA.D.1.4, 2.4; MA.E.1.4, 2.4, 3.4; SS.B.1.4, 2.4; SS.D.2.4
- 15.09 Compare safety and environmental regulations between nations and methods of enforcing compliance. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4; LA.D.2.4; MA.B.1.4; MA.E.1.4, 2.4, 3.4; SC.G.2.4, SC.D.2.4; SS.B.1.4, 2.4; SS.D.2.4
- 16.0 Describe how proteins, carbohydrates, lipids, vitamins, and minerals are digested and how food preparation impacts nutritional value and quality--The student will be able to:
- 16.04 Conduct experiments that examine the chemical processes involved in digestion of carbohydrates, proteins, fats, vitamins and minerals. MA.B.1.4, 2.4, 3.4, 4.4; SC.A.1.4, SC.A.2.4, SC.B.1.4, SC.B.2.4, SC.C.2.4, SC.D.1.4, SC.D.2.4, SC.F.1.4, SC.F.1.4, SC.G.1.4, SC.H.1.4, SC.H.2.4
- 16.05 Describe the cellular process involved in assimilating carbohydrates, proteins, fats, vitamins and minerals LA.A.1.4, 2.4; SC.A.1.4, SC.B.1.4, SC.B.2.4, SC.C.2.4, SC.F.1.4, SC.G.1.4
- 16.06 Analyze the role of enzymes in digestion: SC.A.1.4, SC.B.1.4, SC.B.2.4, SC.C.2.4, SC.F.1.4, SC.G.1.4
- 16.07 Examine the relationship between water and nutrient absorption. LA.A.1.4, 2.4; LA.B.1.4, 2.4; MA.B.1.4, 2.4, 3.4, 4.4; SC.A.1.4, SC.B.1.4, SC.B.2.4, SC.C.2.4, SC.F.1.4, SC.G.1.4
- 17.0 Describe the biological composition and processing of foods--The student will be able to:
- 17.03 Recognize characteristics of spoiled food. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; SC.A.1.4, SC.A.2.4; SC.B.1.4, SC.F.1.4, SC.H.2.4
- 17.04 Apply the principles of managing Food, Acid, Time, Temperature, Oxygen, and Moisture (FATTOM) in controlling food spoilage. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; SC.A.1.4, SC.A.2.4, SC.B.2.4, SC.C.2.4, SC.F.1.4, SC.H.2.4
- 17.05 Test the effects of yeasts, bacteria, molds and enzymes in food processing. MA.E.1.4, 2.4, 3.4; SC.F.1.4, SC.G.1.4, SC.H.1.4, SC.A.1.4
- 18.0 Describe the chemical composition and processing of foods--The student will be able to:
- 18.06 Analyze the molecular structure of carbohydrates: SC.A.1.4, SC.A.2.4; SC.F.1.4

- 18.07 Analyze the molecular structure of fats: SC.A.1.4, SC.A.2.4; SC.F.1.4
 - 18.08 Analyze the molecular structure of proteins: SC.A.1.4, SC.A.2.4; SC.F.1.4
 - 18.09 Explain the concepts of pH and buffers as they relate to foods LA.A.1.4, 2.4; LA.B.1.4, 2.4; MA.A.1.4, 3.4; SC.A.1.4, SC.A.2.4, SC.F.1.4
 - 18.10 Examine the effects of processing and preparation on the chemical composition of Foods: SC.A.1.4; SC.A.2.4; SC.B.1.4; SC.B.2.4
 - 18.11 Explain the use of proteins, fats and carbohydrates. LA.A.1.4, 2.4; LA.B.1.4, 2.4; SC.D.2.4, SC.F.1.4, SC.H.3.4
- 19.0 Describe the physical composition and processing of foods--The student will be able to:
- 19.05 Examine methods for separating food products. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4; MA.A.1.4; MA.B.2.4, 3.4; S.B.1.4, SC.B.2.4, SC.C.2.4
 - 19.06 Analyze factors related to product mixing: MA.B.2.4, 3.4; MA.D.1.4, 2.4
 - 19.07 Analyze mechanical factors influencing product preparation: MA.D.1.4, 2.4
 - 19.08 Compare processing methods used to enhance shelf life of fresh produce. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; MA.E.1.4, 2.4, 3.4; SC.A.2.4, SC.F.1.4
- 20.0 Discuss environmental issues impacting the production and processing of foods--The student will be able to:
- 20.05 Describe the requirements of water used in food processing. LA.A.1.4, 2.4; LA.B.1.4, 2.4; MA.A.1.4; MA.B.2.4; MA.B.3.4;
 - 20.06 Discuss methods used in food processing for disposing of solid wastes. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4; MA.A.1.4; MA.B.2.4; MA.B.3.4; SC.G.1.4, SC.G.2.4, SC.H.3.4
 - 20.07 Compare and contrast methods of wastewater management used in food processing. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; MA.E.1.4, 2.4, 3.4; SC.G.1.4, SC.G.2.4, SC.H.3.4
- 21.0 Demonstrate leadership, employability, communications and human relations skills.
- 21.06 Identify the opportunities for leadership development available through an appropriate student and/or professional organization. LA.C.1.4, 2.4, 3.4; SS.C.1.4, 2.4
 - 21.07 Identify acceptable work habits and personal characteristics. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; LA.D.1.4, 2.4; SS.B.2.4
 - 21.08 Identify acceptable employee hygiene habits. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; LA.D.1.4, 2.4; SS.B.2.4
 - 21.09 Identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; LA.D.1.4, 2.4; SS.B.2.4
 - 21.10 Describe the importance of industry certifications. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; LA.D.1.4, 2.4; SS.B.2.4
 - 21.11 Conduct small informal and formal group meetings. LA.C.1.4, 2.4, 3.4; SS.C.1.4, 2.4
- 22.0 Write lab reports to record, interpret and evaluate data.

- 22.05 Apply the steps of the scientific methods. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; MA.E.1.4, 2.4, 3.4; SC.H.1.4, SC.H.2.4, SC.H.3.4
 - 22.06 Design and write reports of food science laboratory experiments including mathematical and statistical examples for evaluation of collected data. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.3.4; MA.E.1.4, 2.4, 3.4; SC.H.1.4, SC.H.2.4, SC.H.3.4
- 23.0 Explain the process of food product development.
- 23.08 Develop a new food product. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4, 3.4; LA.D.2.4; SC.H.1.4, SC.H.2.4, SC.H.3.4
 - 23.09 Conduct and analyze a food market test. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, LA.D.2.4 MA.E.1.4, 2.4, 3.4
 - 23.10 Apply sensory analysis techniques. LA.A.1.4, 2.4; LA.B.1.4, 2.4; LA.C.1.4, 2.4; LA.D.2.4; SC.F.1.4, SC.F.2.4, SC.H.1.4, SC.H.2.4
 - 23.11 Conduct a cost analysis for a new food product. LA.B.1.4, 2.4; MA.D.1.4, 2.4