Food Science
Kansas Agricultural Education

Hours Completed _____ Competencies Completed _____/245
Verification Signatures:

Student: _____ Date: _____

Instructor: _____ Date: _____

Name: _____

Instructor:_____ School Year:_____

Key to Integrated Competencies
(CD)- Career Development
(L)- Leadership
(E) - Experienced Based
(LK) - LifeKnowledge Lessons
(LA) – Language Arts
(M) - Math
(S) – Science
(SS) – Social Science

Circle to indicate level of competency achieved:
3 - Skilled-Works Independently **2** Limited skill-Needs assistance **1** -Skill undeveloped-but received instruction **0** -No exposure

Determining the Meaning and Importance of Food Science:

3 2 1 0 1. Explain the concept of food science (LA))
3 2 1 0 2. Explain the importance of food science (LA)
3 2 1 0 3. Identify the segments of the food Industry (CD) (LK HS 66, 126)
3 2 1 0 4. Identify careers related to food science (CD) (LK MS29, AHS 40)
3 2 1 0 5. Describe the education and skills needed for a career in food science (CD, LA)
3 2 1 0 6. Identify the two main occupations involved in food science and the food science industry (CD)

Examining the Food Service Industry:

3 2 1 0 1. Describe the food service industry (CD) (LK HS 18, HS 111)
3 2 1 0 2. Explain how food science and the food service industry are related CD
3 2 1 0 3. Identify trends to the food service industry (CD)

Explaining Human Digestion:

3 2 1 0 1. Explain the digestive process (S, LA)
3 2 1 0 2. Identify the parts of the digestive system (S) (LK HS 31)
3 2 1 0 3. Identify secretions and enzymes that aid in the digestive process (S)
3 2 1 0 4. Identify types of digestive system disorders (S)

Describing the Major Food Nutrients:

3 2 1 0 1. Explain the importance of nutrition (LA) (LK MS 30, HS 42)
3 2 1 0 2. Identify and describe the six major nutrients needed for good nutrition (S)

Determining the Impact of Diet on Health

3 2 1 0 1. Explain how calories relate to nutrition MS (S, LA)
3 2 1 0 2. Explain claims made on food labels related to diet and health (LA)
3 2 1 0 3. Describe the Recommended Dietary Allowance (RDA) (LA)

Determining the Chemistry of Water in Foods

3 2 1 0 1. Identify effects of hydrogen bonding in water (S)
3 2 1 0 2. Demonstrate the chemical function of water as a dispersing medium (S, E)
3 2 1 0 3. Indicate differences between water activity and moisture of food (S)
3 2 1 0 4. Show characteristics of water that affect its use (S)

B1-2 Examining the Chemistry of Lipids (Fats)

3 2 1 0 1. Identify the chemical composition of lipids (S)
3 2 1 0 2. Recognize the differences between saturated and unsaturated fats (S)
3 2 1 0 3. Examine the chemical changes that fats undergo S
3 2 1 0 4. Identify the functions of lipids in foods (S)

Examining the Chemistry of Proteins

3 2 1 0 1. Identify chemical parts of proteins molecule (S)
3 2 1 0 2. Distinguish between conjugated proteins and nonconjugated proteins (S)
3 2 1 0 3. Recognize the different types of reactions of food proteins (S)
3 2 1 0 4. Identify the different properties of food proteins (S)

B1-4 Describing the Chemistry of Carbohydrates

3 2 1 0 1. Identify carbohydrates and their chemical composition (S)
3 2 1 0 2. Identify simple carbohydrates (S)
3 2 1 0 3. Identify functional properties of monosaccharides (S)
3 2 1 0 4. Identify large complex carbohydrates (S)

Discussing the Chemistry of Flavor Enhancing Substances

3 2 1 0 1. Identify basic tastes (S)

Investigating Water in Food Physics

3 2 1 0 1. Identify the importance of hydrogen bonding in water molecular structure (S)
3 2 1 0 2. Differentiate between adsorbed water and bound water (S)
3 2 1 0 3. Identify the relationship between bound water and water activity (S)

3 2 1 0 4. Identify the function of water in heat transfer in foods (S)

Examining Lipids (Fats) in Food Physics

3 2 1 0 1. Examine the structure of lipids (S)
3 2 1 0 2. 3 2 1 0 Investigate controlled crystallization or tempering of lipids (S)
3 2 1 0 3. Recognized the effect of visible light upon the decomposition of fats (S)
3 2 1 0 4. Observe differences in melting points of fats that reflect strength of bonds (S)
3 2 1 0 5. Demonstrate liquid fate as a food conductor of heat (S)

Explaining Proteins in Food Physics

3 2 1 0 1. Identify the structure of proteins (S)
3 2 1 0 2. Recognize physical properties of proteins (S)
3 2 1 0 3. Investigate the development of synergism (S)
3 2 1 0 4. Explain the structure of collagen and factors affecting it (S, LA)
3 2 1 0 5. Identify factors that affect the functional properties of protein (S)

Explaining Carbohydrates in Foods Physics

3 2 1 0 1. Identify functional properties of carbohydrates (S)
3 2 1 0 2. Recognize the structural differences and similarities in carbohydrates (S)
3 2 1 0 3. Recognize that the structure of the carbohydrate molecule affects the reaction and properties of compound (S)
3 2 1 0 4. Recognize that molecular size and weight affect the affinity of water by a sugar molecule (S)
3 2 1 0 5. Identify the effect of heat upon the starch molecule without water and with water (S)

Classifying Chemical Food Additives

3 2 1 0 1. Define chemical food additive (S)
3 2 1 0 2. Explain the functions of food additives (S)
3 2 1 0 3. Identify the classifications for food additives(S)

Explaining Chemical Preservatives:

3 2 1 0 1. Describe the mechanisms of chemical food preservatives (S) (LK HS 61, HS 111, AHS 46)
3 2 1 0 2. Identify common types of chemical food preservatives (S)

Discussing Laws Related To Food Additives and Food Safety

3 2 1 0 1. Identify the agencies that oversee food additive and food safety regulations (SS)
3 2 1 0 2. Identify the primary laws/regulations related to food additives and food safety (SS)
3 2 1 0 3. Describe the process for approving a food additive (SS)
3 2 1 0 4. Describe recent controversies over food additives (LA, SS)

Explaining Microbes and Food Spoilage Caused by Microbial Growth:

3 2 1 0 1. Describe food microbiology (S, LA) (LK HS 42)
3 2 1 0 2. Describe different types of microbes (S, LA) (LK HS 51)
3 2 1 0 3. Describe how microbes cause food spoilage (S, LA) (LK HS 127)

Describing the Prevention of Food Spoilage

3 2 1 0 1. Describe causes of food spoilage (S, LA)
3 2 1 0 2. Describe methods of preventing food spoilage (S, LA)

Identifying Food-Borne Illnesses and Their Prevention

3 2 1 0 1. Describe the symptoms of food-borne illnesses (LA, S)
3 2 1 0 2. Describe the causes of food-borne illnesses (S, LA)
3 2 1 0 3. Describe prevention of food-borne illnesses (LA, S)

Using Heat in Food Preservation

3 2 1 0 1. Describe methods of using heat to preserve food (S)
3 2 1 0 2. Describe the role of time and temperature in heat preservation (S)
3 2 1 0 3. Describe the process of canning (LA)

Using Cold in Food Preservation

3 2 1 0 1. Describe methods of using cold to preserve food (S, LA)
3 2 1 0 2. Describe the important variables in refrigerated cold preservation (S, LA)

Using Drying, Chemical Additives and Irradiation in Food Preservation

3 2 1 0 1. Describe the use of dehydration as a food preservation method (S, LA)
3 2 1 0 2. Describe the use of irradiation as a food preservation method (S, LA)
3 2 1 0 3. Describe the use of chemical additives as a food preservation method (S, LA)

Using Fermentation

3 2 1 0 1. Describe the fermentation process (S, LA)
3 2 1 0 2. Describe the benefits of fermenting food (S, LA)
3 2 1 0 3. Identifying common foods that are preserved by fermentation.(S)

Explaining the Importance of Sanitation:

3 2 1 0 1. Describe the importance of sanitation. (LK HS 12)
3 2 1 0 2. Identify sources of contamination. (LK HS 14)
3 2 1 0 3. Differentiate between cleaning and sanitizing.

Practicing Personal Hygiene in Food Processing

3 2 1 0 1. Describe the importance of personal hygiene in food processing. (CD, LA)
3 2 1 0 2. Describe methods of demonstrating good personal hygiene habits. (CD, LA)

Describing the Cleanliness of Processing Equipment

3 2 1 0 1. Describe the importance of the cleanliness of food processing equipment. (CD, LA)
3 2 1 0 2. Identify factors that affect the cleanliness of food processing equipment. (CD)

Maintaining a Clean Processing Plant:

3 2 1 0 1. Identify factors that affect cleanliness in a food processing plant (CD)
3 2 1 0 2. Describe the importance of cleanliness in a food processing plant (CD, LA)

Using Approved Practices in Handling and Processing Dairy Products

3 2 1 0 1. Explain milk handling from the cow to the

processing plant (LA)

3 2 1 0 2. Describe the processing of fluid milk (LA)

3 2 1 0 3. Describe the processing of milk products and by-products (E, LA)

Identifying Dairy Products

3 2 1 0 1. Identify fluid milk products

3 2 1 0 2. Identify processed milk products

3 2 1 0 3. Distinguish milk products from non-dairy products (CD)

Describing Proper Handling of Red Meat

3 2 1 0 1. Describe proper handling of red meat prior to cooking (CD, LA)

3 2 1 0 2. Explain recommended red meat cooking procedures (LA)

3 2 1 0 3. Identify recommended storage of cooked meats

Identifying Cuts of Meat

3 2 1 0 1. Explain the difference between primal and retail cuts (CD, LA)

3 2 1 0 2. Explain the process of determining whether meat is beef, veal, pork or lamb (CD, LA)

3 2 1 0 3. Identify beef and veal cuts (CD)

3 2 1 0 4. Identify pork cuts (CD)

3 2 1 0 5. Identify lamb cuts (CD)

Quality and Yield Meat Grading

3 2 1 0 1. Explain how the quality grade influences the taste of meat (CD, M)

3 2 1 0 2. Explain the factors that influence yield grade of meat (CD, M)

3 2 1 0 3. Calculate Yield Grade (E, M)

Discussing the Processing of Meat:

3 2 1 0 1. Explain slaughtering/harvesting (CD. LA) (LK HS 96)

3 2 1 0 2. Describe cutting, grinding, and blending meat (E, CD)

3 2 1 0 3. Explain tenderizing processes (aging, cubing, chemical/electrical treatment, and marinating) (LA)

3 2 1 0 4. Describe preservation methods (dehydrating, curing, smoking, canning, freezing, freeze drying and irradiating) (LA)

Handling and Processing Poultry and Eggs:
LK HS 83, HS 96

3 2 1 0 1. Describe the steps in processing poultry (LA)

3 2 1 0 2. Describe the grading process for poultry and eggs (LA)

3 2 1 0 3. Identify the parts of egg

3 2 1 0 4. Describe the steps in egg processing (LA)

Handling and Processing Fish and Shellfish:

3 2 1 0 1. Identify types of fish and shellfish used for food

3 2 1 0 2. Define aquaculture (S)

3 2 1 0 3. Identify spoilage issues related to seafood

3 2 1 0 4. Identify methods of preserving fish

3 2 1 0 5. Describe the commercial processing of fish CD

3 2 1 0 6. List the general structure and composition of a grain seed S

3 2 1 0 7. Describe the grain milling process CD

3 2 1 0 8. List the types of flour and explain their uses

3 2 1 0 9. Describe the processing of breakfast cereals (LA)

3 2 1 0 10. Explain the concept of “value-added” agriculture in terms of cereal grains

Identifying Cereal Products

3 2 1 0 1. Identify the role of further processors

3 2 1 0 2. Identify common food products made from cereal grains

3 2 1 0 3. Identify industrial products made from cereal grains

3 2 1 0 4. Explain the importance of industrial products in increasing the demand for cereal grains (LA)

3 2 1 0 5. Identify the environmental benefits of using renewable resources for industrial products.(SS, LA)

Handling and Processing Fruits and Vegetables:

3 2 1 0 1. Identify general properties and characteristics of produce (fruits and vegetables)

3 2 1 0 2. Identify harvesting methods for produce

3 2 1 0 3. Describe proper handling and storing of produce (LA)

3 2 1 0 4. Identify enzyme activity detrimental to fruit and vegetable storage (S)

3 2 1 0 5. Identify alternative methods for preserving produce

Producing Beverages

3 2 1 0 1. Identify the types of beverages produced in the food industry

3 2 1 0 2. Identify sweeteners used in beverages

3 2 1 0 3. Describe characteristics of soft drinks (LA)

3 2 1 0 4. Describe characteristics of non-carbonated and “healthy beverages)(LA)

3 2 1 0 5. Describe the process for making beer and wine (LA)

Producing Candies and Sweets

3 2 1 0 1. Explain how sugar is produced

3 2 1 0 2. Define and classify confectioneries

3 2 1 0 3. Explain the process of sugar reduction and why it is important S

3 2 1 0 4. Explain how chocolate is produced

3 2 1 0 5. Describe the confectionary manufacturing process CD

Processing of Fats and Oils

3 2 1 0 1. Identify the sources of fats and oils used in food processing

3 2 1 0 2. List the different properties of fats and oils(S)

3 2 1 0 3. Describe the production and processing methods of fats and oils (LA)

3 2 1 0 4. List the essential fatty acids and explain why they are important (S)

3 2 1 0 5. Identify key health issues related to fats and oils

Using Safe Methods in Storing Foods in the Home:

3 2 1 0 1. Describe methods of safely storing foods in the home (LK HS 41)

3 2 1 0 2. Identify potential food storage problems in homes (LK AHS 32)

Following Safe Methods in Handling and Preparing Foods in the Home0la,

3 2 1 0 1. Describe methods of safely handling and preparing foods in the home (LA)
3 2 1 0 2. Describe the importance of cooking meats to the proper temperatures (LA)
3 2 1 0 3. Observe a meal being prepared in the home and identify potential safety issues (E, LA)

Food Packaging and Labeling

3 2 1 0 1. Explain the importance of food packaging (LA)
3 2 1 0 2. Identify the characteristics of a food packaging material
3 2 1 0 3. Identify the different materials and forms of food packages
3 2 1 0 4. Explain the three different types of food packaging containers
3 2 1 0 5. Explain the importance of food labels
3 2 1 0 6. Identify foods affected by food labeling
3 2 1 0 7. Identify the parts of a food label
3 2 1 0 8. Explain the format of a nutrition panel
3 2 1 0 9. Define terms that may be found on a food label (LA)

Determining Risks Associated with Food

3 2 1 0 1. Explain the difference between true and perceived risks (L, LA)
3 2 1 0 2. Identify risks that can be caused by food
3 2 1 0 3. Identify ways that risk can be eliminated

Explain Potential Carcinogenic Hazards Associated with Food

3 2 1 0 1. Define carcinogens (S, LA)
3 2 1 0 2. Identify carcinogenic hazards associated with foods (S)

Explaining Potential Pesticide Hazards Associated with Food

3 2 1 0 1. Identify the benefits of using pesticides
3 2 1 0 2. Explain how pesticide levels can be reduced (LA)

Identifying Government Agencies That Regulate Food:

3 2 1 0 1. Discuss the Food and Drug Administration (SS, LA, CD)
3 2 1 0 2. Discuss the Food Safety and Inspection Service (SS, LA, CD)
3 2 1 0 3. Discuss the Environmental Protection Agency (SS, LA, CD)
3 2 1 0 4. Discuss the United States Department of Agriculture (SS, LA, CD)

Complying With GMP and HACCP

3 2 1 0 1. Define and explain the importance of GMP (LA)
3 2 1 0 2. Define and explain the HACCP system in food safety (LA)

Explaining the Development Process of New Food Products:

3 2 1 0 1. Understand the importance of supermarket inventory management (CD)
3 2 1 0 2. Outline the product life cycle (CD)
3 2 1 0 3. Describe the research and development process (CD)
3 2 1 0 4. Explain the importance of packaging for new food products

Describing the Marketing of Foods

3 2 1 0 1. Define the utilities provided by the food marketing system (LA)
3 2 1 0 2. Describe the functions provided by the food marketing system (LA)
3 2 1 0 3. List and define the 4 Ps of marketing (CD)
3 2 1 0 4. Describe the type of markets for food products (SS, LA)
3 2 1 0 5. Explain the role of public food programs (SS, LA)

Assessing The Role of Governments in Food Economics

3 2 1 0 1. Explain concentration ration
3 2 1 0 2. Identify the government's role in ensuring competition in the food markets (SS, LA)
3 2 1 0 3. Define workable competition
3 2 1 0 4. Define the government's role in promoting food safety (LA, CD)
3 2 1 0 5. Explain the government's role in ensuring food security (SS, LA)

Associating Food Economics with Economic Development: LK MS59, HS102

3 2 1 0 1. List and define the most common challenges facing developing countries (LA, SS)
3 2 1 0 2. Explain why nations specialize and trade (SS, LA)
3 2 1 0 3. Explain the role of Public Law 480 in promoting economic development. (SS, LA)
3 2 1 0 4. Understand the role of trade agreements (SS, LA)

Using Genetic Engineering with Food

3 2 1 0 1. Explain the terms "genetic engineering," "GMO," and "transgenic." (S, LA)
3 2 1 0 2. Learn how GMOs are created in the laboratory (S)
3 2 1 0 3. Describe the uses of GMOs (S, LA)
3 2 1 0 4. Explain the regulation of GMOs

Debating the Pros and Cons of Genetically Modified Foods

3 2 1 0 1. Acquire a basic understanding of how GMOs are formed (S)
3 2 1 0 2. Describe the positive aspects of GMOs in food (S, LA)
3 2 1 0 3. Describe the negative aspects of GMOs in foods (S, LA)
3 2 1 0 4. Debate issues for future leadership roles (LA, L)

Analyzing the Supply of Food For An Increasing World Population

3 2 1 0 1. Describe the roles of governments in the food supply LA, SS)
3 2 1 0 2. Describe the relationship between technology and food (LA)
3 2 1 0 3. Describe how food production affects economic development (SS, LA)

Exploring Future Food Products

3 2 1 0 1. Describe the role of biotechnology in food science (S, LA)
3 2 1 0 2. Describe future food products from improved crops (S, LA)
3 2 1 0 3. Describe the future of food producing animals (S, LA)

Addressing Environmental Concerns Related to Food Production and Processing

3 2 1 0 1. Describe the methods of disposing of

food processing solid wastes (LA)

3 2 1 0 2. Discuss wastewater issues related to food processing (LA)

3 2 1 0 3. Describe the wastewater treatment process (LA, S)

Opportunities in FFA

3 2 1 0 1. Research and present a 4-6 minute speech on an agricultural topic.(L, LA, E) (LK HS 86 & 90)

3 2 1 0 2. Serve on a POA committee. (L, E) (LK AHS 47)

3 2 1 0 3. Participate in at least one activity above the chapter level.(L, E)

3 2 1 0 4. Demonstrate concise, impromptu speaking skills. (LA, L, E) (LK HS 84)

3 2 1 0 5. Conduct strengths assessment to determine possible career options. (L, CD, E) (LK HS 31)

SAE

3 2 1 0 1. Maintain records on income and expense. (M, CD, E) (LK HS 129)

3 2 1 0 2. Complete a cash flow statement. (M, CD, E)

3 2 1 0 3. Complete year end records. (M, CD, E)

3 2 1 0 4. Complete a SAE packet. (M, CD, E)

3 2 1 0 5. Complete a proficiency award application. (M, CD, E) (LK AHS 53)

Work Place Skills

Decision Making/Problem Solving

1. Describe the factors that impact on decision making: (LK HS 20)

3 2 1 0 a. Needs and wants (LK HS 95)

3 2 1 0 b. Values (LK HS 10)

3 2 1 0 c. Goals (LK HS 44)

3 2 1 0 d. Standards

3 2 1 0 2. Distinguish between types of decisions: economic and/or technical.

3 2 1 0 3. Apply the steps In interpreting a problem, coming up with a plan and then a result. (LK HS 40)

Computer Literacy

3 2 1 0 1. Define, understand and use common computer technology terminology.

3 2 1 0 2. Compose, organize, and edit financial records using a computer.

3 2 1 0 3. Use functions to store, query, retrieve, and sort data.

3 2 1 0 4. Use presentation and multimedia software to design/create and variety of presentations.

3 2 1 0 5. Access, navigate, and use on-line services.

3 2 1 0 6. Apply ethical considerations to the operation and management of information systems common to the FFA organization.

Listening Skills

1. Follows oral instructions:

3 2 1 0 a. Listen for and identify key words.

3 2 1 0 b. Listen for words that identify a procedure.

3 2 1 0 c. Listen for steps or actions to be performed.

3 2 1 0 d. Listen for clues regarding the order or sequence in which a task is performed.

3 2 1 0 2. Distinguish fact, opinion, and inference in oral communication.

3 2 1 0 3. Interpret nonverbal cues (eye contact, posture, gestures).

3 2 1 0 4. Analyze a speaker's point of view.

3 2 1 0 5. Draw conclusions or make generalizations from another's oral communication.

3 2 1 0 6. Restate or paraphrase a conversation to confirm what was said.

3 2 1 0 7. Reduce barriers (or interference) that may impede effective listening.