

EL DORADO UNION HIGH SCHOOL DISTRICT
EDUCATIONAL SERVICES
Course of Study Information Page

COURSE TITLE Agriculture Food Science					
DISTRICT COURSE NUMBER 0712			4-DIGIT STATE COURSE CODE (COMPLETED BY SILT) 7131		
Rationale:		Agriculture Food Science is designed to teach students science through food, the food industry, agriculture, and technological advances. Through laboratory experimentation, class discussions, and hands-on activities, students will apply scientific principles as they pertain to agriculture food science.			
Course Description that will be in the Course Directory:		The course is designed to help students learn the relationships between agriculture, food, science, and nutrition. Basic laws of Chemistry, Biology, Microbiology, and Physics are applied to the production, processing, preservation, and packaging of food. Problem-solving and experimentation will provide application opportunities for sciences as well as educate students so that they may become informed consumers of food products. Whenever possible, food products used in experimentation in class will be locally grown and harvested to deepen the appreciation of food production and use. Throughout the course, students will have the opportunity to participate in intra-curricular FFA activities as well as the development and maintenance of a Supervised Agricultural Experience (SAE).			
How Does This Course align with or meet State and District content standards?		College-Preparatory Elective (G)			
Core Subjects:		<i>Select up to two that apply:</i> ☐ Arts ☐ Civics and Government ☒ Not Core Subject ☐ Economics ☐ History ☐ English ☐ Mathematics ☐ Foreign Language ☐ Reading / Language Arts ☐ Geography ☐ Science			
CDE CALPADS Course Descriptors: (See Page 2 for Definitions)		CTE TECH PREP COURSE INDICATORS ☐ Tech Prep (32) (Higher Ed) ☐ Tech Prep & ROP(33) (Higher Ed) ☐ ROP (30) ☐ N/A		CTE COURSE CONTENT CODE ☐ CTE Introductory (01) ☒ CTE Concentrator (02) ☐ CTE Completer (03) ☐ Voc Subject _____ ☐ N/A	
		INSTRUCTIONAL LEVEL CODE ☐ Remedial (35) ☐ Honors UC-Certified (39) ☐ Honors Non-UC-Certified (34) ☒ College (40) ☐ N/A			
Length of Course:		☒ Year ☐ Semester			
Grade Level(s):		☐ 9 ☒ 10 ☒ 11 ☒ 12			
Credit:		☒ Number of credits: 10 ☒ Meets graduation requirements (subject G) ☒ Request for UC "a-g" requirements CSU/UC requirement G		☒ College Prep	
Prerequisites:		Ag Science			
Department(s):		Agricultrue/CTE			
District Sites:		Union Mine High School			

Board of Trustees COS Adoption Date:	
Textbooks / Instructional Materials:	The Food Lab J. Kenji Lopez-Alt w.w. Norton & Company 1st Edition 2015 National FFA Organization -- www.ffa.org Food and Drug Administration -- www.fda.gov United States Department of Agriculture -- www.usda.gov Food Network -- www.foodnetwork.com Netflix -- www.Netflix.com Federal Food Safety -- www.foodsafety.gov California Food Handlers -- www.cafoodhandlers.com
Funding Source:	
Board of Trustees Textbook Adoption Date:	

Definitions

CALPADS	California Longitudinal Pupil Achievement Data System
CTE Technical Prep	A course within a CTE technical career pathway or program that has been articulated with postsecondary education or through an apprenticeship program of at least 2 years following secondary instruction.
Instructional Level Code	Represents a nonstandard instructional level at which the content of a specific course is either above or below a 'standard' course instructional level. These levels may be identified by the actual level of instruction or identified by equating the course content and level of instruction with a state or nationally recognized advanced course of studies, such as IB or AP.
Instructional Level Honors, UC Certified	Includes all AP courses.
Instructional Level Honors, non UC Certified	Requires Board approval.
Instructional Level College	Includes ACE courses. Equivalent to college course and content, but not an AP course. Not related to section, but to course.

EDUCATIONAL SERVICES**Course Title: Agriculture Food Science****TABLE OF CONTENTS**

<u>STATE CONTENT STANDARD #</u>	<u>CONTENT STANDARD/UNIT TOPIC</u>	<u>PAGE</u>
FPP.01 CCTC Framework, FPP.01.01, FPP.01.02, FPP.01.03 Performance Indicator	Food Handling and Safety	4
C13.0, C13.1, C13.2, FPP.02 CCTC Framework, FPP.02.01, FPP.02.03 Performance Indicator	The Science of Food	6
FPP.02.02.01.a., FPP.02.02.01.b., FPP.02.02.01.c.	Basic Chemistry	8
FPP.02.01.01a, FPP.02.01.01.c, FPP.02.02.02.a	Organic Chemistry: The Macronutrients	10
C10.0, C10.1, C10.2, C10.3, C10.4, C11.0, C11.1, C11.2, C11.3, C11.4, C11.5, C11.6	Food Chemistry: The Micro components	12
C5.0,C5.1, C5.2, C5.4	Food Microbiology: Living Organisms in Food	14
FPP.03 CCTC Framework, FPP.03.01, FPP.03.02, FPP.03.03 Performance Indicator	Food Preservation and Packaging	16
FPP.04 CCTC Framework, FPP.04.01, FPP.04.02, FPP.04.03 Performance Indicator:	Farm to Table	17
C3.0, C3.1, C3.2, C3.3, C3.4, C3.5	Working with Complex Food Systems	19

EDUCATIONAL SERVICES

Department: **Agriculture/CTE**Course Title: **Agriculture Food Science**Course Number: **0712**Unit Title: **Food Handling and Safety****Content Area Standards** (Please identify the source): List content standards students will master in this unit.

FPP.01 CCTC Framework: Develop and implement procedures to ensure safety, sanitation, and quality in food product

FPP.01.01 Performance Indicator: Analyze and manage operational and safety procedures in food products and processing facilities.

FPP.01.02 Performance indicator: Apply food safety and sanitation procedures in handling and processing food products to ensure food quality.

FPP.01.03 Performance indicator: Apply food safety procedures when storing food products to ensure food quality.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students learn the California industry guidelines and regulations on Food Handling and Food Safety. They will explore the role of the government in the food industry and discuss the impact on recalls and food alerts. Throughout this unit, students will gain an understanding of basic local, state, and federal sanitation regulations as they pertain to food production and service. They will explore the source of food contamination and investigate prevention methods.

In this unit, students will learn the role of the government in the food industry. Students will explore the impact of recalls and consumer alerts on society and the agriculture/ food industry. They will gain a basic understanding of local, state, and federal regulations as they pertain to food production and service.

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Anchor Standards.

Through various laboratories, activities, and hands-on exercises, students will determine the essential quality and properties of food items/ ingredients used in food preparation. Personal grooming, hygiene, and proper hand-washing are a few of the essential components of food handling that students will study to achieve compliance with local, state, and federal health and safety codes. Students will demonstrate their understanding of safe and sanitary food handling procedures in all food handling, including food receiving, storage, production, service, and clean-up. Proper cooking, storage, and refrigeration temperatures will be identified and charted. Students will learn how foods become contaminated and the effects of food-borne illnesses on the human body. They will compile facts, statistics, and data to create a class Food Handling & Safety Manual. They will navigate various Internet sources; including foodsafety.gov, usda.gov, ServSafe, etc. Students will be given the opportunity to and encouraged to complete Food Handling certification online training and to become certified food handlers as required per California state law to work or volunteer in the food industry.

Knife Types and Safety- In this lesson, students will be exposed to the many types of knives used in food preparation. We will have an industry representative speak and demonstrate to the class on knife identification, proper knife selection, safe knife handling, and various techniques in Agriculture Food Science used in preparing food. Chopping, slicing, dicing, and paring are a few methods students will explore.

California Food Handlers Training & Certification- Students will utilize online training opportunities to study and take the California Food Handlers certification process. This course covers such topics as basic food safety, personal hygiene, cross-contamination & allergens, time & temperature, and cleaning & sanitation. California requires all individuals who are employed or volunteer in the food industry to become certified food handlers. This activity provides students with essential career technical education and resume-building skills. Upon completion of the certification, students are immediately employable in the California food industry

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

Demonstration of successful knife techniques
Obtaining the California Food Handlers Certification

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments.

Students will be given extra support from the teacher and additional time as needed to complete both assessments and will have the choice of a verbal or written response when applicable.

EDUCATIONAL SERVICES

Department: **Agriculture/ CTE**Course Title: **Agriculture Food Science**Course Number: **0712**Unit Title: **The Science of Food****Content Area Standards** (Please identify the source): List content standards students will master in this unit.

C13.0 Design agricultural experiments using the scientific method.

C13.1 State the steps of the scientific method. C13.2 Analyze an agricultural problem and devise a solution based on the scientific method.

FPP.02 CCTC Framework: Apply principles of nutrition, biology, microbiology, chemistry and human behavior to the development of food products.

FPP.02.01 Performance Indicator: Apply principles of nutrition and biology to develop food products that provide a safe, wholesome, and nutritious food supply for local and global food systems.

FPP.02.03 Performance Indicator: Apply principles of human behavior to develop food products to provide a safe, wholesome, and nutritious food supply for local and global food systems.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students will evaluate how the modern food industry has changed due to the contributions of food scientists and evaluate articles and data that show these changes. Students will learn the importance of the scientific method in this industry and practice skills in measuring using metrics. Students will set up valid scientific experiments and through observations, they will document their findings. Students will learn how when developing new food products, food scientists must learn how to differentiate between subjective and objective data. This unit also explores how the human factor of sensory evaluation is impacted by cultural and environmental factors. This unit provides for critical thinking opportunities in evaluating the food industry and its impacts on society/ consumers. Within this unit, students will utilize many mathematical applications to analyze data, create graphs, and draft charts.

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Anchor Standards.

Measuring Accurately Lab Activity- For the results of experiments to be consistent and valid, you must take accurate measurements. In this experiment, students will compare methods and tools used for measuring liquid and dry volumes. Students will measure liquid volumes in beakers, liquid measuring cups, and graduated cylinders. Students will also measure dry volumes (flour) by scooping, spooning, fluffing, and massing. Hypothesizing which method they believe will be the most accurate in measuring both the liquid and dry volumes. Students will draft a Scientific Method based lab report and determine if the data collected supports or disproves their hypothesis. Students will navigate conversion tables and calculate various quantities of both liquid and dry ingredients.

Taste Test Trials- Students will develop a taste test panel activity. They will have to apply their knowledge of sensory preference and design a test that removes bias from factors such as peer pressure, number association, environmental factors, and cultural preferences. They will demonstrate their ability to separate subjective and objective data in a comprehensive lab report. Students will create data tables that record information collected from their tests. Finally, students will discuss how this type of research can impact the development of new food products.

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

Successful completion of Lab Report for Measuring Accurately Lab
Data Analysis on Taste Test Trails

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments. Students will be given additional support and extension activities to enhance their learning as needed.

EDUCATIONAL SERVICES

Department: **Agriculture/CTE**Course Title: **Agriculture Food Science**Course Number: **0712**Unit Title: **Basic Chemistry****Content Area Standards** (Please identify the source): List content standards students will master in this unit.

FPP.02.02.01.a. Examine and describe the basic chemical makeup of different types of food.

FPP.02.02.01.b. Explain how the chemical and physical properties of foods influence nutritional value and eating quality.

FPP.02.02.01.c. design and conduct experiments to determine the chemical and physical properties of food products.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

In this Unit, students will either be exposed to for the first time or review basic concepts in Chemistry. Students will experiment with chemical bonding, physical and chemical changes, measuring energy, energy transfer, and Acid and Base reactions. Students learn how these chemical reactions and changes are also responsible for notable changes in foods and that this knowledge allows food scientists to make predictions about how food ingredients will react with one another. Energy transfer and how energy is measured will also be studied, the relationship between heat and temperature will be measured. Students will calibrate thermometers and use math to perform temperature conversions. The role of pH will also be studied and how it relates to food preservation; acid and base reactions will be used in experiments in leavening baked goods. Water will be examined as a universal solvent and students will discuss its role in food preparation, and its role in the human body. Students will also learn that the shelf life and risk for microbial contamination are directly linked to the water activity and pH of a food product.

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Anchor Standards.

Freezing Cream Activity - During this activity, you will evaluate the role salt plays in the process of freezing ice cream. To prepare a smooth ice cream product, you must constantly mix the ingredients during the chilling process. You will take temperature readings to examine the flow of energy during the physical and chemical changes that occur as you mix ingredients. Students will create 4 variations (rock salt, and table salt, in varying amounts) throughout their class groupings. Data will be collected from each group and shared as a class. Students must then use the data to determine the difference in the amounts and types of salt contributed to the quality of the ice creams created.

Making Butter- In this lab, students will explore how butter is made. They will investigate the properties of various dairy products and classify their suitability as a base for butter. Utilizing heavy cream, students will observe the physical and chemical reactions that occur as butter is made. Students will use higher-level descriptive language to record their observations and explain the cause and effect reactions of the experiment. Students will employ the Scientific method and prepare a formal lab report on their findings. They will be able to taste their results and reflect

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

Describe the basic structures of atoms.

Identify symbols commonly used on the periodic table used in food science.

Define ionic and covalent bonding.

Explain the distance between pure substances and mixtures

Lab Reports from Freezing Cream Lab

Formal Lab report for Making Butter Lab

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments. As needed students will be given the option to work with supportive peers and to complete a modified lab report with additional time.

EDUCATIONAL SERVICES

Department: **Agriculture/CTE**Course Title: **Agriculture Food Science**Course Number: **0712**Unit Title: **The Macronutrients****Content Area Standards** (Please identify the source): List content standards students will master in this unit.

FPP.02.01.01a Research and summarize properties of common food constituents (e.g., proteins, carbohydrates, fats, vitamins, minerals)

FPP.02.01.01.c Analyze the properties of food products to identify food constituents and evaluate the nutritional value

FPP.02.02.02.a Research and report methods of nutritional planning to meet essential needs for the human diet.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students learn about the Organic components that make up food products, carbohydrates, lipids, Page 3 Agriculture Food Science and proteins. They study the molecular structure of both mono and disaccharides and experiment with variables that impact the formation of sugar crystals. Students evaluate how sugar crystal formation impacts the food industry by experimenting with crystal formation in a fudge-making lab activity. Students also explain how polysaccharides differ from mono and disaccharides and evaluate how starches that contain amylose, and amylopectin behave differently in providing structure to baked goods and serving as gelling agents. Students experiment with complex carbohydrates and can evaluate a starches' ability to be used as a thickener by performing viscosity tests. Students can depict the chemical structure of saturated and unsaturated fatty acids and predict how they bind with different food ingredients based on their chemical structure. Students also learn how the double bonds in fatty acids are highly reactive to oxygen and experiment with oxidation of fats in a potato chip lab activity. Students can also describe the characteristics of hydrogenated oils and discuss how they impact human health. Students research fats and create educational material to be used in the community the highlight heart-healthy fats and recipes. Students will identify amino acid classifications based on nutritional use and chemical properties of the side chains. They will describe the primary, secondary, and tertiary structures of proteins, and discuss factors that denature proteins. Students also apply basic principles of the chemistry of protein to cooking eggs, milk, and meat products. Finally, students learn how some new food products are created as a result of enzymatic activity and experiment with ways of control enzymatic browning in foods.

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Anchor Standards.

Sugars in the Diet - Students will identify hidden sources of sugar in the diet. They will create a chart identifying common sources and the total sugar content in grams. (One example is ketchup, which has 4g per tablespoon.) Students will report their findings to the class. The class will then work collaboratively to determine the "top ten" offenders. Students will work in pairs to create an informational brochure to educate the general public about the hidden sugars in these foods. Students will investigate the role of sugar substitutes in our diet and conduct scientific testing to compare and contrast the various sugar substitute types.

Diet trends - Students will explore recent studies on diet trends; their sources, and health risks. Students will use their research to write a position paper in which they will present to the class. They will use reasoning and relevant evidence to support the claims in their argument. Comparing and contrasting their studied diet to the "my plate" USDA recommendations.

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

Describe how the chemical structures of the macronutrients are related and defined. Explain the relationship of each chemical structure to the compound's function in food preparation.

Completion of Assigned Sugars in the Diet Chart

The written or oral report on Diet Trends

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments. Students will be given choices in ways to show mastery of the concepts and will also have a choice in the items they research. Additional time and teacher support will be given as needed.

EDUCATIONAL SERVICES

Department: **Agriculture/CTE**Course Title: **Agriculture Food Science**Course Number: **0712**Unit Title: **Food Chemistry: The Microcomponents****Content Area Standards** (Please identify the source): List content standards students will master in this unit.

C10.0 Explain soil science principles.

C10.1 Recognize the major soil components and types.

C10.2 Summarize how soil texture, structure, pH, and salinity affect plant growth.

C10.3 Assess water delivery and irrigation system options.

C10.4 Differentiate among the types, uses, and applications of amendments and fertilizers.

C11.0 Analyze plant growth and development.

C11.1 Understand the anatomy and functions of plant systems and structures.

C11.2 Identify plant growth requirements.

C11.3 Discern between annual, biennial, and perennial life cycles.

C11.4 Examine sexual and asexual reproduction in plants.

C11.5 Understand photosynthesis and the roles of the sun, chlorophyll, sugar, oxygen, carbon dioxide, and water in the process.

C11.6 Summarize the respiration process in the breakdown of food and organic matter.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students will look at the different properties of vitamins and minerals, and examine the general characteristics of each category of vitamins and minerals. How these vitamins and minerals affect the quality of foods will also be analyzed. Students will research and write a short paper that answers the question "What food other than milk or orange juice contributes sufficient calcium in my diet?" Students also evaluate the mineral content of milk and other milk products by exposing it to high temperatures so that only white ash remains and the mineral content can be measured. In this unit, phytochemicals will also be studied and students will identify possible links between phytochemicals and disease prevention. Students also learn and practice writing shorthand symbols for complex organic compounds such as phytochemicals. Students will be able to describe the functions of food analogs and will experiment with sugar substitutes and distinguish between nutritive and non-nutritive sweeteners. Fat and salt substitutes will also be discussed. Students are challenged to evaluate how different sugar and fat substitutes will affect a product on the chemical level and eventually the finished product. Lab activity will be conducted where students compare the sensory characteristics of 5 sugar substitutes in both hot and cold beverages. Food Additives are a hot topic and will also be addressed in this unit. Students will describe the functions of food additives and explore the role of the Food and Drug Administration in regulating food additives. Students will also practice reading food labels and identifying additive ingredients, they will also learn how to look up the function and classification of the additive on the GRAS list by using the FDA's website.

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Anchor Standards.

Health Benefits of Spices - Reports claim that spices such as chili, cinnamon, cumin, coriander, and turmeric have potential health benefits. Using independent research and information obtained in class and through text, students will write a research paper on spice of their choosing. Findings will be reported to the class, citing specific evidence to support their conclusion Report must include ways to incorporate more of the spice when cooking.

Food Additive/ Food Labeling and Analog Socratic Seminar -Students will debate hot topics and key questions related to the use and safety of food additives and food labeling. They will research facts and information ahead of the seminar to ensure they have research-based facts to support the arguments they make during the seminar. A sample question used in the seminar is "Do you feel safe consuming food additives? Why or why not?". Students will study Genetically Modified Organisms (GMOs) and explain the role they play in Agriculture as well as the food industry. Students will explore food labeling and marketing techniques and be able to discern useful information by reading agricultural and food product labels. They will evaluate nutrition labels and design standards that will

enable them to make healthy food choices for their lifestyles.

"Buzz words" and Organic Taste Test- Students will evaluate various foods that have been "labeled" as one of the popular buzz words. (Non-GMO, Gluten-free, Antibiotic-free, free-range, organic, preservative-free, etc) Noting all sensory similarities and differences, students will determine if they can taste why these foods are so labeled. Students will then conduct a blind taste test to see if marketing plays a role in their personal preferences. This assignment aims to create informed consumers of agricultural food products and allow students the opportunity to formulate their preferences and tastes.

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

Differentiate between fat-soluble vitamins and water-soluble vitamins.

Identify non-nutritive functions of vitamins and minerals used as food additives.

Describe how to reduce vitamin and mineral losses during home food storage and preparation

Calculate sodium intake for one day.

Analyze daily diet programs.

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments.

Students will be given many opportunities to practice these skills and will discover concepts by learning about real-life examples.

EDUCATIONAL SERVICES

Department: **Agriculture/CTE**Course Title: **Agriculture Food Science**Course Number: **0712**Unit Title: **Food Microbiology: Living Organisms in Food****Content Area Standards** (Please identify the source): List content standards students will master in this unit.

C5.0 Compare the structure and function of plants, animals, bacteria, and viruses.

C5.1 Identify the function of cells.

C5.2 Analyze the anatomy and physiology of cells. C5.3 Understand various cell actions, such as osmosis and cell division.

C5.4 Compare and contrast plant and animal cells, bacteria, and viruses.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

In this unit, students will look at the benefits of microbes in the food supply and how they are used to create new food products by their intentional addition. Unwanted contamination of food by pathogenic microbes will also be addressed as well as ways food scientists work to ensure a safe food supply. Students will describe the types of microbes that impact the food supply and list the factors that impact the growth and multiplication of single-celled organisms. Students will also identify food products that are a result of fermentation. Students can apply their knowledge of pH, temperature, and water activity from the previous units to methods of controlling microbe growth. Students will study the process of making sauerkraut, pickles, and cheese and will participate in a pickle-making lab activity. They will be viewing a documentary on Netflix; a "Cooked" series to gain perspective Contamination of foods by pathogens will be identified as a serious human health risk, and on Page 5 Agriculture Food Science students will identify three main types of food contaminates. They will also research in teams and develop a report on a specific pathogen like E-Coli0157:H7, Salmonella, Listeria Monocytogenes, Staphylococcus Aureus, and Clostridium Botulinum. Keeping food safe will be a major focus and students will learn how to be food-safe at home and also how the government is involved in keeping food safe. Students will become familiar with basic food safety principles such as cleaning, preventing cross-contamination, proper cooking and holding temperatures, and how to keep foods out of the temperature danger zone. The importance of proper hygiene and thorough hand washing will be emphasized. Students will apply their knowledge of microbes and food safety by creating a HACCP (Hazard Analysis and Critical Control Points) plan for our food science laboratory facility. This knowledge will build upon the food handling and food safety unit to ensure comprehension and success in passing the California Food Handlers Certification.

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Anchor Standards.

Factors Affecting Yeast Growth - Yeast provides the leavening for many bread products. With moisture, a food supply, and warm temperatures, yeast cells will grow and multiply. Yeast cells digest food and release two by-products: carbon dioxide and alcohol. The carbon dioxide is trapped in the bread dough creating a light, airy texture. The alcohol evaporates. In this experiment, students will determine whether salt and sugar enhance or inhibit the production of carbon dioxide by the yeast. Yeast will be added to bottles that contain warm water and flour, salt, and sugar. A balloon will be placed over the opening of the bottle to trap the carbon dioxide given off. Students will use collected data to make predictions about rising times for yeast bread that contain sugar and those that contain high levels of salt

Gram Stain Test for Bacteria - Students will swab various surfaces and objects and create cultures to evaluate for microbes present. Students will use the cultures to conduct the Gram stain test. They will also build on their knowledge of enzyme activity by heat fixing their slide to ensure all enzymes are deactivated and will not destroy the specimen on the slide. They will also research and report on how knowing if bacteria stains positive or negative gives us clues about how that bacteria behaves and how it can be identified and controlled

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

Avoiding Contamination - Students will use the HACCP process to develop a procedure for monitoring the safety of the laboratory during and after conducting experiments related to the chapter. Students will develop a protocol to ensure that bacteria samples do not contaminate surfaces that will be used for food production by other classes and groups. This assignment will be presented to the class.

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments. Students will present the findings of their research in contamination protocol in small groups. They will be given choice in the way their findings are presented.

EDUCATIONAL SERVICES

Department: **Agriculture/CTE**Course Title: **Agriculture Food Science**Course Number: **0712**Unit Title: **Food Preservation and Packaging****Content Area Standards** (Please identify the source): List content standards students will master in this unit.

FPP.03 CCTC Framework: Select and process food products for storage, distribution, and consumption.

FPP.03.01 Performance Indicator: Implement selection, evaluation, and inspection techniques to ensure safe and quality food products.

FPP.03.02 Performance Indicator: Design and apply techniques of food processing, preservation, packaging, and presentation for distribution and consumption of food products.

FPP.03.03 Performance Indicator: Create food distribution plans and procedures to ensure the safe delivery of food products.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

The chemical and microbial methods used to help preserve foods in the previous units may not always be enough to prevent all types of food spoilage so in this unit students explore ways further processing and packaging methods are used to preserve our food supply. Students will evaluate various hot and cold processing methods including commercial canning and freezing.

Learning the relationship between water activity and food preservation is a key concept of this unit. Students will also apply their knowledge of microbes and water activity from the previous unit. Methods of dehydration will be studied and students will be able to identify the ideal water activity levels needed to preserve different types of foods. Students will also participate in a lab where Page 6 Agriculture Food Science they will make beef jerky. They will calculate the mass lost during drying and evaluate the impact that surface area has on drying rates.

There are many trends and new technologies available for the preservation and improvement of foods. Irradiation, Packaging Innovations, and Biotechnology will be evaluated for their advantages and disadvantages in food preservation. Students will learn the basic principles associated with these technologies and also become aware of public concerns that also exist. Students will create a survey and interview members of the community to collect information on how much people know about these food technologies and how they feel about their safety. Students will learn what molecular gastronomy is, how it is transforming modern cuisine and through laboratory experience, they can employ this new technology.

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Anchor Standards.

Comparing Canned and Frozen Foods - Students can see the effects of heat on stopping enzyme activity, and how freezing can impact product quality. Students compare the color, flavor, texture, and cost of foods that are chilled, frozen, and canned. They also evaluate other variables that can change the sensory characteristics of the foods. Findings are reported in a lab report.

Packaging to Prevent Oxidative Rancidity - Deterioration of fats in storage can cause oxidative rancidity. Oxidative rancidity occurs when oxygen reacts with double bonds in mono- and polyunsaturated fats. The result is an undesirable odor and flavor. Foods at high risk for the development of rancid flavors include potato chips and crackers. In this experiment, students will determine whether exposure to light increases oxidative rancidity by conducting a sensory evaluation on crackers, then subjecting the crackers to light in different storage containers. Students will taste a test sample from the bags every other day for the week. Students will determine the effect wrapping and storage technique had on oxidative rancidity.

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

Assessments in this unit will be in the form of learning activities and experimentation with food storage practices. Students will learn by doing and be able to report back on the effects of light and oxygen on oxidative rancidity.

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments.

Students will complete these experiments in small groups and will be able to run their trials as many times as needed. In addition, the partner setting will allow students to learn from their peers.

EDUCATIONAL SERVICES

Department: **Agriculture/CTE**Course Title: **Agriculture Food Science**Course Number: **0712**Unit Title: **Farm to Table****Content Area Standards** (Please identify the source): List content standards students will master in this unit.

FPP.04 CCTC Framework: Explain the scope of the food industry and the historical and current developments of food products and processing.

FPP.04.01 Performance Indicator: Examine the scope of the food industry by evaluating local and global policies, trends, and customs for food production.

FPP.04.02 Performance Indicator: Evaluate the significance and implications of changes and trends in the food products and processing industry in the local and global food system.

FPP.04.03 Performance Indicator: Identify and explain the purpose of industry organizations, groups, and regulatory agencies that influence the local and global food system.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Living in California, students are surrounded by Agriculture. However, many students fail to see the connection or understand the reliance on agriculture. In this unit, students will explore the vast supply of fresh agricultural commodities located here in California. Students will investigate the role of agriculture in supplying our world with the most basic resources. They will follow agriculture commodities through their life cycles by learning the basic components of production agriculture, packaging, and marketing, all the way through to sustainability and compost. Through the use of California Agriculture in the Classroom curriculum as well as many community agriculture connections, students will have the opportunity to identify and understand various local agricultural commodities.

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Anchor Standards.

School Garden- Students will be planning, planting, and maintaining a school garden. They will choose seasonally appropriate crops to plant, prepare the soil and calculate a harvesting schedule. Students will gain knowledge of production agriculture practices and taste the "fruits of their labor". They will examine the role of pesticides, herbicides, and fungicides in gardening. Upon harvest, students will design and implement a recipe that incorporates items from the school garden.

Weekly Commodity Highlight- Through the use of California Agriculture in the Classroom Commodity Fact Sheets, Students will highlight a California commodity each week in this unit. Focusing on local commodities, they will explore the history, uses, economic value, sources, and facts. Every week will include a lab, taste testing, or other hands-on activity. Students will create Page 7 Agriculture Food Science original recipes for each commodity. Culminating in a collection of recipes that they will use to create a class recipe book.

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

Assessments in this unit will be formative and will compose of hands-on learning activities including planting, composting, application of herbicide, pesticide, and fungicide as well as planning for and preparing a meal including the products of their labor.

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments. Students will complete these assessments in group and classwide settings with constant guidance from the instructor.

EDUCATIONAL SERVICES

Department: **Agriculture/CTE**Course Title: **Agriculture Food Science**Course Number: **0712**Unit Title: **Working with Complex Food Systems****Content Area Standards** (Please identify the source): List content standards students will master in this unit.

C3.0 Analyze the effects of technology on agriculture.

C3.1 Describe how technology affects the logistics of moving an agricultural commodity from producer to consumer.

C3.2 Understand how technology influences factors such as labor, efficiency, diversity, availability, mechanization, and communication.

C3.3 Communicate public concern for technological advancements in agriculture, such as genetically modified organisms.

C3.4 Research the laws and regulations concerning biotechnology.

C3.5 Integrate the use of technology when collecting and analyzing data.

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

Students can bring together the knowledge from all previous units to see how the compounds in foods will affect one another. Complex food systems contain the various types of compounds described in earlier units and this unit explores the challenges of working with them.

Students will study many methods used to sort and separate foods by mechanical and chemical methods. Separation by density will be evaluated using the examples of creaming and rendering. Pressure separating examples will include milling feeds grains. Students will also be able to explain how the principle of osmosis is used to separate food at the chemical level.

Students will also learn that developing new food products is an ongoing venture in food science. Students will contract descriptive and analytical research, and list the steps in developing a new food product. A Key assignment that is the culminating experience for this course is that students will work in teams to develop a new food product or add value to a current product. They will have to apply knowledge from all previous units to develop their product. They will conduct an organizational brainstorm, finalize an idea and begin research, submit a supplies list, conduct trials on formulations, conduct sensory evaluation trials, create packaging including nutritional analysis and labeling, create an advertising campaign, make samples of the final product, and give a presentation to a board of directors of a company.

Lastly, students will explore career opportunities in the food science industry. A guest speaker will be invited to come and speak to the class about their job in the field, and students will be able to research a particular job in the industry and prepare a resume targeted to that particular career.

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Anchor Standards.

Separation Techniques - Students will select one complex food system (corn, milk, soy, or wheat) and identify the separation technique used to develop each of the five different products produced from this complex food.

Package Design - Students will create a packaging design and an advertising campaign for a new food item. What would your new TV commercial show? How would your advertisements look? In which publications would they appear? What information will be on the packaging? What is your slogan? etc.

Developing a New Food Product - This activity will provide the opportunity for students to simulate the experiences of a company's product development steps. Scenario: You are employed by the Frozen Gourmet Food company. At the last departmental meeting, your boss reported company sales as compared to your main competitor, Frozen Delights, Inc., Frozen Gourmet ranked a poor second. Your product development team is to present a proposal for a new frozen entree. This entree will be the first in a new line of products designed to appeal to health-conscious

consumers. The new entree must: • be cost-competitive • be nutrient-dense to attract the largest possible number of health-conscious consumers • meet FDA standards for nutrition labeling and label claims Page 8 Agriculture Food Science • be marketable Students will develop new food product according to guidelines, conduct sensory evaluations, assemble nutritional information, and present all findings and product to the company board of directors.

Career Interest Profile and Reality Check - Students will use the California Career Zone website to assess their strengths and interests and how those things could correlate to a career. Upon completion of the survey, students will choose up to 4 careers that they were matched with and write a description of that career. At least one career must be in the agriculture industry. Students will also go through the California Reality check in which they determine minimum monetary needs for their desired lifestyle. Students complete a proposed budget that contains information on housing, utilities, food, transportation, clothing, health care, personal needs, entertainment, miscellaneous costs, and savings. Students then compare the average pay of their desired career with the estimated budget to determine if their selected career will allow them to live the lifestyle they would like. Students will use the interest survey to help them select their SAE (Supervised Agriculture Experience) and begin the record-keeping process in the Official FFA record book.

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

Career Research Paper & Presentation - Students choose one of the careers selected in the previous project complete a career plan. Students will first write a career research paper using MLA format. Information in the paper should include industry information, job description, qualifications, education needed, pay range, and projected demand for professionals in their chosen industry. Students will then create a career plan which includes the job description, interests, personal qualifications needed (things they need to know and things they need to know how to do), post-secondary education options, and professional associations. They should use information from www.cacareerzone.org first. And then fill in with information from at least two more sources, one professional association, and one college. Students must cite each source used and the websites must be a .gov, .edu, and .org. Career presentations will be given to the class.

Job Applications - Students will be given a variety of job applications. Students will complete a minimum of 4 job applications to demonstrate proficiency in the correct completion of information and correct formatting.

Creating a Resume and Cover Letter - Students will create a cover letter and resume detailing the competencies and skills attained while enrolled in the Agricultural Food Science course. Students will assume to be preparing this information for potential employment at a local company.

The Interview - Students will research potential job interview questions and select 10. Students will then compose potential answers to the questions they selected. Students will then pair up and share their questions and answers with a partner. The discussion will be held on the dos and don'ts of a job interview.

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments.

The formative and summative assessments in this unit are interest-based. Students will be allowed to research and present on the career of their choice and research to the depth at which suits their career interest. Students will be given guidance and assistance with the research and presentation process.