Hospitality & Tourism

TEXAS CTE Your journey starts here.

Scope & Sequence

Course Name: Food Science **PEIMS Code:** 13023000		**Course Credit:** 1 **Course Requirements:** This course is recommended for students in grades 11-12 **Prerequisites:** Three units of science, including chemistry and biology **Recommended Prerequisites:** Principles of Hospitality and Tourism
Course Description: In Food Science students conduct laboratory and field investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Food Science is the study of the nature of foods, the causes of deterioration, the principles underlying food processing, and the improvement of foods for the consuming public. Students must meet the 40% laboratory and fieldwork requirement. This course satisfies a high school science graduation requirement.		
NOTE: This is a suggested scope and sequence for the course content. This content will work with any textbook or instructional materials. If locally adapted, make sure all TEKS are covered.		
Total Number of Periods **Total Number of Minutes** **Total Number of Hours**	175 Periods 7,875 Minutes 131.25 Hours*	*Schedule calculations based on 175/180 calendar days. For 0.5 credit courses, schedule is calculated out of 88/90 days. Scope and sequence allows additional time for guest speakers, student presentations, field trips, remediation, extended learning activities, etc.
Unit Number, Title, and Brief Description	**# of Class Periods*** (assumes 45-minute periods) Total minutes per unit	**TEKS Covered** **130.256 Knowledge and skills**
Unit 1: Food Science Lab Students will spend at least 40% of the course will be spent conducting laboratory	70 Periods 3,150 Minutes	2. The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:

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and field investigations pertaining to food science. During labs, students will demonstrate safe practices and be conscientious in conserving resources/materials and ensure proper disposal/recycling of waste.		(A) demonstrate safe practices during laboratory and field investigations; and (B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials
Unit 2: Scientific Methods and Equipment Students will understand and follow the scientific method in all food science labs. Students will distinguish between scientific hypothesis and theories. Students will identify and demonstrate proper use of standard laboratory equipment including glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, gel electrophoresis apparatuses, micropipettors, hand lenses, Celsius thermometers, hot plates, timing devices, cameras, Petri dishes, lab incubators, dissection equipment, meter sticks, etc. Students will collect, organize, analyze, and evaluate quantitative and qualitative data through scientific reasoning and critical thinking to draw inferences and solve problems.	10 Periods 450 Minutes	3. The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to: (A) know the definition of science and understand that it has limitations, as specified in subsection (b)(4) of this section; (B) know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power that have been tested over a wide variety of conditions are incorporated into theories; (C) know scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but they may be subject to change as new areas of science and new technologies are developed; (D) distinguish between scientific hypotheses and scientific theories; (E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology;

		(F) collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, gel electrophoresis apparatuses, micropipettors, hand lenses, Celsius thermometers, hot plates, lab notebooks or journals, timing devices, cameras, Petri dishes, lab incubators, dissection equipment, meter sticks, and models, diagrams, or samples of biological specimens or structures; (G) analyze, evaluate, make inferences, and predict trends from data; and (H) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports 4. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to: (A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student; (B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;

		(C) draw inferences based on data related to promotional materials for products and services; (D) evaluate the impact of scientific research on society and the environment
Unit 3: Chemistry Concepts Explore the basic chemistry concepts that relate to food science. Students will Recognize chemical symbols on the periodic table for common elements and their role as the building blocks for compounds in food. Students will be able to define matter and compare and contrast substances (elements and compounds) and mixtures (homogenous and heterogeneous). Students will explain and demonstrate how heat is transferred via conduction, convection and radiation. Students will compare the effect of various temperatures on rates of chemical and physical properties. Students will define acid, base and salt, and describe the pH scale and how to measure pH.	10 Periods 450 Minutes	5. The student analyzes the role of acids and bases in the food sciences. The student is expected to: (A) evaluate physical and chemical properties of acids and bases 7. The student examines the chemical properties of food. The student is expected to: (A) describe elements, compounds, mixtures, and formulas related to food science; (B) compare heterogeneous and homogeneous mixtures; (C) use chemical symbols, formulas, and equations in food science; and (D) analyze chemical and physical changes in food 8. The student analyzes solutions, colloids, solids, gels, foams, and emulsions in food science. The student is expected to: (A) identify the solvent and solute in a given solution; (B) compare unsaturated, saturated, and supersaturated solutions, including boiling and freezing points; (C) calculate the concentration of a solution using mass percent; (D) describe the properties of colloidal dispersions 9. The student analyzes the functions of enzymes in food science. The student is expected to: (B) explain the relationship between an enzyme and a substrate

		13. The student analyzes the processes of energy production in food. The student is expected to: (A) discuss molecular motion and temperature; (B) examine heat transfer processes such as conduction, convection, and radiation; (D) analyze rates of reaction using various temperatures 18. The student evaluates the properties of water and their effects on food production. The student is expected to: (A) identify the properties of water
Unit 4: Biological Macromolecules Students will learn and understand that living things take in the large biological molecules, also known as macromolecules, found in the food including carbohydrates, proteins, and lipids (such as fats) and they are used to power cells. Students will evaluate the properties, roles, and effects that carbohydrates, proteins, and lipids have on food production and preparation.	10 Periods 450 Minutes	14. The student evaluates the properties of carbohydrates in food and their effects on food production. The student is expected to: (A) discuss photosynthesis; (B) identify the chemical structures of carbohydrates; (D) compare the structures of simple and complex carbohydrates and how these structures affect food production 15. The student evaluates the properties of fats in food and their effects on food production. The student is expected to: (A) identify the chemical structure of saturated and unsaturated fats; (B) compare the properties of saturated and unsaturated fats 16. The student evaluates the properties of proteins and their effects on food production. The student is expected to: (A) explain the processes of protein denaturation and coagulation

Unit 5: Food Safety and Sanitation This unit will expose students to the important regulations, safety standards, and sanitation practices that are implemented within this industry. Using industry standards students will understand, demonstrate and apply principles of food safety and sanitation on a daily basis in labs, activities and all applications pertaining to food preparation and storage. Students will discuss the three major types of food contaminants: physical, chemical, and biological and differentiate among food borne illness, food spoilage and food sanitation. Students will understand national, state and local agencies responsible for both safety and sanitation.	10 Periods 450 Minutes	6. The student evaluates the principles of microbiology and food safety practices. The student is expected to: (E) analyze sanitary food-handling practices; and (F) prepare for a state or national food manager's sanitation certification or alternative credential within the field of food science technology 19. The student analyzes processes that destroy bacteria during food production. The student is expected to: (A) examine the food irradiation process; and (B) investigate the pasteurization process
Unit 6: Food Science Fundamentals Students will differentiate between organic and inorganic compounds and classify the major food constituents as organic (carbohydrates, fat, protein, vitamins) or	25 Periods 1,125 Minutes	5. The student analyzes the role of acids and bases in the food sciences. The student is expected to: (B) analyze the relationship of pH to the properties, safety, and freshness of food

inorganic (water, minerals). Students will explain the importance of water as a food constituent and explain the relationship between the molecular structure of water and the functional properties of water (melting point, boiling point, role as a solvent and disperser, heat transfer medium). Students will define acid, base and salt, and identify sensory properties and roles in determining the quality characteristics (color, flavor, texture) and safety of food. Students will define food additives, discuss the various purposes of food additives in food products, and identify advantages and disadvantages of their use.		8. The student analyzes solutions, colloids, solids, gels, foams, and emulsions in food science. The student is expected to: (E) investigate the relationships among the three parts of an emulsion; and (F) create various food emulsions 9. The student analyzes the functions of enzymes in food science. The student is expected to: (A) describe the role of enzymes as catalysts in chemical reactions of food; (C) analyze the functions of enzymes in digestion, including the factors that influence enzyme activity; and (D) analyze enzyme reactions in food preparation 11. The student assesses the reaction of leavening agents in baked products. The student is expected to: (A) identify various leavening agents and describe their role; (B) analyze the role of acids as leavening agents; (C) compare doughs and batters; (D) conduct laboratory experiments with various leavening agents using the scientific processes; and (E) create baked products using various leavening agents 12. The student explores the roles of food additives. The student is expected to: (A) evaluate the various types of food additives such as incidental, intentional, natural, and artificial;

		(B) investigate the various roles of food additives such as food preservation, nutritive value, and sensory characteristics; and (C) research agencies involved in regulating food additives 13. The student analyzes the processes of energy production in food. The student is expected to: (C) investigate the role of latent heat in phase changes in food production such as crystallization and condensation 14. The student evaluates the properties of carbohydrates in food and their effects on food production. The student is expected to: (C) describe the functions of carbohydrates in food production such as a caramelizing agent, crystallizing agent, and thickening agent; (E) describe various process such as gelatinization, retrogradation, and syneresis in food production; and (F) create food products using simple and/or complex carbohydrates 15. The student evaluates the properties of fats in food and their effects on food production. The student is expected to: (C) examine the functions of fats in food production; (D) explore methods for controlling fat oxidation; (E) analyze the effects of temperature on fats in food preparation; (F) conduct laboratory experiments using the scientific processes to explore the functions of fats in food production; and (G) create food products using saturated and unsaturated fats

		16. The student evaluates the properties of proteins and their effects on food production. The student is expected to: (B) examine the functions of proteins in food productions such as emulsifiers, foams, and gluten formation; (C) analyze the effect of temperature on protein in food production and storage; (D) explore moist and dry heat methods for preparing protein rich foods; and (E) create food products using protein 17. The student evaluates the properties of vitamins and minerals and their effects on food production. The student is expected to: (A) discuss the functions of vitamins and minerals in food production; (B) compare the effects of food production on water- and fat-soluble vitamins; and (C) assess the interrelationships among vitamins and minerals in food production 18. The student evaluates the properties of water and their effects on food production. The student is expected to: (B) compare the effects of hard and soft water on food production; (C) analyze the phases of water and their effects on food production; and (D) explain the functions of water in food production such as a heat medium and a solvent and create a food product

Unit 7: Microbiology of Food Students will discuss the three major types of food contaminants: physical, chemical, and biological and differentiate among food borne illness, food spoilage and food sanitation. Students will differentiate among yeast, bacterial and mold fermentation and identify food products produced for each type of fermentation.	15 Periods 675 Minutes	4. The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to: (E) evaluate models according to their limitations in representing biological objects or events; and (F) research and describe the history of biology and contributions of scientists 6. The student evaluates the principles of microbiology and food safety practices. The student is expected to: (A) investigate the properties of microorganisms that cause food spoilage; (B) compare food intoxication and food infection; (C) examine methods to destroy or inactivate harmful pathogens in foods; (D) compare beneficial and harmful microorganisms 10. The student evaluates the role of fermentation in food science. The student is expected to: (A) analyze reasons food is fermented; (B) assess the role of bacteria in food fermentation; and (C) prepare various fermented food products

Unit 8: Food Preservation and Packaging Students will compare and contrast different food preservation methods and the resultant quality of preserved foods. Students will identify the major functions of packaging used for food products, differentiating between the functions of primary, secondary and tertiary packaging. Students will compare and contrast processes used for home and commercial preservation and evaluate resulting quality of the products preserved using different commercial and/or home methods. Students will examine the factors to be considered in the selection and use of successful preservation techniques including canning, freezing, pasteurization, curing, dehydration, freeze-drying, refrigeration, modified atmosphere packaging, and irradiation.	15 Periods 675 Minutes	20. The student examines packaging and labeling guidelines. The student is expected to: (A) research federal food packaging guidelines; (B) analyze components of appropriate commercial food containers; (C) describe controlled-atmosphere packaging; and (D) describe information required on a food label 21. The student analyzes food preservation processes. The student is expected to: (A) describe reasons for food preservation; (B) compare methods of dehydration and create a food product using dehydration; (C) analyze various methods of personal and commercial food canning; and (D) examine the various methods of personal and commercial food freezing
Unit 9: Employability Skills This unit will to continue students' exploration of the professional standards and employability skills required by business and industry. Students will	10 Periods 450 Minutes	1. The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to: (A) apply interpersonal communication skills in business and industry settings; (B) explain and recognize the value of collaboration within the workplace;

expand their understanding that responsibility, time management, organization, positive attitude, and good character have a large impact on employability and job retention. Additionally, students will be able to categorize and demonstrate the personality traits and professional/personal etiquette that are needed to succeed in the hospitality and tourism industry. Students will also be able to identify and describe the work ethic needed for career advancement in the hospitality and tourism industry (e.g., skill sets, work schedules, travel/relocation, teamwork, communication skills, flexibility and adaptability etc.).		(C) examine the importance of time management to succeed in the workforce; (D) identify work ethics/professionalism in a job setting; and (E) develop problem-solving and critical-thinking skills