COURSE TITLE: Food Science

Course Description:

Food Science provides an in-depth study of the application of scientific principles through the investigation and research of food properties. This course will explore food science methods and equipment, food chemistry concepts, biological macromolecules, food science fundamentals, microbiology of foods, and food preservation and packaging. This course must be taught in a chemistry laboratory, a residential-style kitchen, or a commercial kitchen.

Potential Certifications/Credentials:

ASK Institute – Concepts of Business Management / ASK Institute – Concepts of Entrepreneurship / Certified Guest Service Professional / Food and Beverage – Skills for Success / ServSafe Food Handler / ServSafe Manager

Course Scope and Sequence

Topic #	Topic Title	Estimated Hours
1	Foundational Standards	15
2	Food Science Methods	20
3	Food Chemistry Concepts	25
4	Biological Macromolecules	20
5	Food Science Fundamentals	30
6	Microbiology of Food	15
7	Food Preservation and Packaging	15

Plans of Instruction

Foundational Standards

Supporting–will be taught throughout the course as needed for the unit.

F1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces.

F2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.

F3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing.

F4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway.

F5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.

Topic 2 Title: Food Science Methods

Content Standards

1. Identify and apply the six steps of the scientific method as it relates to food preparation and production.
   a. Create tentative and testable hypotheses based on scientific theories using descriptive, comparative, and experimental investigations.
      Examples: effect of temperature on sugar crystal formation at various time intervals; impact of various fats on baked goods; rate of protein denaturation across various methods
   b. Collect and organize qualitative and quantitative data and make measurements with accuracy, using laboratory equipment and technological tools.
      Examples: molarity of sweetened tea; pH of various marinades and solutions; gelatinization ability of heat-processed fruit vs. fresh

c. Analyze data collected from food-based laboratories and communicate valid conclusions supported by data through various methods, including lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.

Unpacked Learning Objectives

Students know:

- The six steps of the scientific method and understand how it can be applied to food preparation and production.
- The types of scientific investigations, and the components of a hypothesis that allows it to be definitively tested.
- The correct usage of laboratory equipment and technological tools that results in accurate measurements and data collection.
- How to summarize and communicate the conclusive findings from food-based laboratories using a variety of reporting methods.

Students are able to:

- Follow the six steps of the scientific method throughout the planning, production, and evaluation of food products.
- Create theoretically supported hypotheses that allow for testing using descriptive, comparative, and experimental investigations.
- Collect and organize qualitative and quantitative data.
- Accurately use laboratory equipment and technological tools to make measurements and gather data.
- Analyze data collected from food-based laboratories.
- Derive and communicate valid conclusions.
- Support their conclusions through various tools and methods, including lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.

Students understand:

- Food item production can be planned, prepared, and evaluated using the six steps of the scientific method.
- Quality investigations begin with strong hypotheses.

- There are basic methods required to accurately measure, collect, and organize data while using laboratory equipment and technological tools.
- Data-collection is important in order to provide supported conclusions that can be properly communicated using a variety of methods.

Driving/Essential Question	How are the six steps of the scientific method used to create scientific investigations in food preparation and food production? How do scientists measure and communicate the results of their experiments?
Exemplar High Quality Task	Students present the results of a self-designed experiment using an appropriate format and professional vocabulary.

Map of Student Learning by Learning Objective

Unpacked Learning Objective SWBAT	**Potential Subtasks for Assessments Formative/Summative**	**Potential Learning Activities** **Link to Differentiation Examples**	**Integrated and Related Academic Content: ELA, Math, Science, and/or Social Studies Concepts and Activities**	**Equipment, Technology and Materials** **Equipment List by CTE Cluster** **Link to Helpful Tech Tools**
Follow the six steps of the scientific method throughout the planning, production, and evaluation of food products.	**Formative:** Vocabulary game, scientific method graphic organizer, class discussion **Summative:** Lab and lab report	Apply vocabulary through a matching game. Students match each step of the scientific method with a description of that step. Present students with a hypothesis that can be tested in the food lab. Prepare for the lab by guiding students through the steps of the scientific	**Math:** Create an infographic showing the key findings, such as six steps of the scientific methods. **Science:** Students will review the six aspects of the scientific method. Students will apply the scientific method in the	Food lab equipment Graphic organizer Digital or physical lab report template

		method as they will take place in the lab setting. Students use a graphic organizer to create a lab report they will complete during the lab. Students conduct an experiment and document each stage in the process, labeling each step in the scientific method. Class discussion on lab results and methods for collecting and communicating data. Students complete their lab report with data collected during the lab.	testing of a food based hypothesis. **ELA:** Use context clues to determine the meaning of unfamiliar written or spoken words.	
Create theoretically supported hypotheses that allow for testing using descriptive, comparative, and experimental investigations.	**Formative:** Vocabulary game, presentation quizzes **Summative:** Research presentation	Play Articulate or Just One to review and assess content vocabulary knowledge. Students will select one topic to research as a group. They will present their research using both technology and 3-D models. Students will create a quiz for their classmates to complete after their presentation to check for understanding.	**Math:** Use descriptive statistics to summarize and describe the characteristics of the dataset. **ELA**: Integrate research information from different sources paraphrasing or summarizing using MLA or APA style.. **Social Studies**: Create an outline for a theoretically supported hypothesis.	Smartboard or projector Classroom supplies for developing 3-D models Student devices

Create theoretically supported hypotheses that allow for testing using descriptive, comparative, and experimental investigations.	**Formative:** Lab planning graphic organizer, class discussion, follow-up hypotheses **Summative:** Lab and lab report	Review the steps of the scientific method and its application to food production. Guide students through the process of developing a hypothesis that can be tested in the food lab. Students work in small groups to refine their hypothesis, develop the steps for their experiment, and create their lab report outline using a graphic organizer. Conduct the student-designed experiments in the food lab. Students document their process using their self-generated lab report. Class discussion on lab results, the type of data collected, and how the data may be communicated. Extend the lesson by asking students to develop follow-up hypotheses for further experimentation.	**Math:** Create charts and graphs to compare and contrast experimental data. **Science:** Students use experimental design to create and run a food-based experiment. Students analyze data to determine the validity of a given hypothesis. Students identify constants within the experiment to eliminate discrepancies in data.	Graphic organizer Food lab equipment
Collect and organize qualitative and quantitative data.	**Formative:** Class discussion **Summative:**	Discuss the importance of accuracy in data and give examples of how inaccurate data changes	**Math:** Use decimals and percentages to calculate reaction rates, elasticity, and strength	Chart paper or poster board and/or student devices with internet access

Accurately use laboratory equipment and technological tools to make measurements and gather data.	Visual expression of lab data	results. Vocabulary: terms of measurement, qualitative and quantitative data Students use the data collected from their previous experiment to create charts and graphs with their results.	**Social Studies:** Write a report on how to accurately use laboratory equipment and tools to gather data.	
Analyze data collected from food-based laboratories. Derive and communicate valid conclusions. Support their conclusions through various tools and methods, including lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.	**Formative:** Visual representation of data, class discussion **Summative:** Formal lab report	Provide students with a variety of scientific readings that include data. After reading, students work in pairs to discuss the best way to communicate the data from the readings. Students use the data from their readings to create a visual. Students share their visuals and discuss their process. Class discussion on methods of communicating conclusions, including lab reports, labeled drawings, journals, summaries, oral reports, and technology-based reports. Conduct a lab in which students can collect quantitative data, such as using salt to lower the freezing point of water and using the salt and ice	**Math:** Use tables to display numerical data, employ bar graphs to compare average ratings, and use Venn diagrams to show overlapping characteristics. **Science:** Students analyze a given data set in order to choose the appropriate graph method to match the given variables. **ELA:** Synthesize information from research to create an oral report that demonstrates command of language, consideration of the audience, and purpose. **Social Studies:** Research various methods of communicating conclusions from an experiment. Determine the	Scientific journals/ articles Chart paper or poster board Classroom art supplies

		mixture to make ice cream. Students use the data collected from this lab to create charts or graphs and to compile a report that communicates and supports their conclusions.	most reliable and write an essay about your opinion.	

Key Vocabulary

scientific method, hypothesis, experimental design, variable, control, data, qualitative, quantitative, conclusion

Work-Based Learning, Simulated Work Experiences, and Experiential Learning:

Lab experiences, data collection and interpretation

CTSO Connection:

FCCLA STAR Event Food Innovations

Certification/Credential Connection:

ServSafe Food Handler, ServSafe Manager

Topic 3 Title: Food Chemistry Concepts

Content Standards

2. Research and report on the structure of an atom, elements of the periodic table, and chemical symbols, formulas, and equations related to the chemical composition of food.
   Examples: molecular structures of complex vs. simple carbohydrates, lipid hydrogenation process, amino acid structures, atomic structure of various vitamins

3. Analyze the chemical structures and reactions of various foods, including elements, compounds, heterogeneous and homogeneous mixtures, formulas, and chemical and physical changes.

4. Describe the roles of solutions, colloids, solids, gels, foams, and emulsions in food preparation, giving scenarios in which each one is employed.

5. Summarize results of experiments testing the variance of pH and functions of enzymes.

6. Compare and contrast the heat transfer processes of conduction, convection, and radiation and their effects on food.

7. Describe the properties of water and their effects on food preparation methods.
   Example: Explain why the high heat capacity of water makes steam a good medium for heat transfer in cooking and water a good fluid to cool food-processing vessels.

Unpacked Learning Objectives

Students know:

- Core concepts in food chemistry composition include atomic structure, periodic table elements, and chemical symbols, formulas, and equations.
- The chemical structure of various foods.
- A variety of foods that can be categorized as heterogeneous and homogeneous mixtures.
- The method to read and create chemical formulas for various foods.
- The chemical and physical changes that can occur in various foods.
- The roles of solutions, colloids, solids, gels, foams and emulsions in food preparation.
- Food preparation methods in which solutions, colloids, solids, gels, foams, and emulsions are employed.
- Through practical experimentation, the variance of pH impacts the function of enzymes.
- The distinct chemical characteristics of the conduction, convection, and radiation heat processes.
- The distinct effects of conduction, convection, and radiation on foods.
- The various properties of water.

- How the various properties of water affect food during preparation.

Students are able to:

- Outline and explain core chemistry concepts as they apply to the chemical composition of food.
- Analyze chemical structures and reactions of various foods to identify and categorize elements, compounds, and mixtures.
- Analyze chemical structures and reactions of various foods to explain formulas, and chemical and physical changes.
- Define and describe solutions, colloids, solids, gels, foams, and emulsions.
- Identify and describe how solutions, colloids, solids, gels, foams, and emulsions are employed in the preparation of food.
- Examine and identify the impact of pH variance on enzyme function from data gathered during practical experimentation.
- Compare and contrast the heat transfer processes of conduction, convection, and radiation.
- Assess the effect of conduction, convection, and radiation on food.
- Summarize the properties of water and explain the effects of water on food preparation methods.

Students understand:

- Food composition can be evaluated and explained according to core chemistry principles.
- Various foods have distinct chemical structures and reactions that can be analyzed by identifying and categorizing them according to core chemistry principles.
- Food preparation techniques rely on chemical processes to create solutions, colloids, solids, gels, foams, and emulsions in order to achieve desired outcomes in the final food product.
- The function of enzymes can be impacted by the pH of its environment.
- The selection of a heat transfer method will have distinct effects on the food item being prepared.
- The use and presence of water in food preparation methods will impact the chemical structure of the final item.

Driving/Essential Question	How does the chemical structure of food affect its preparation?
Exemplar High Quality Task	Students develop and conduct an experiment that demonstrates their understanding of key chemistry concepts and their relationship to food production.

Map of Student Learning by Learning Objective

Unpacked Learning Objective SWBAT	Potential Subtasks for Assessments Formative/Summative	Potential Learning Activities Link to Differentiation Examples	Integrated and Related Academic Content: ELA, Math, Science, and/or Social Studies Concepts and Activities	Equipment, Technology and Materials Equipment List by CTE Cluster Link to Helpful Tech Tools
Outline and explain core chemistry concepts as they apply to the chemical composition of food including the structure of an atom, elements of the periodic table, and chemical symbols, formulas, and equations.	**Formative:** Station rotation activities, class discussion **Summative:** Research presentation on the discovery of elements/ chemistry concepts	Introduce chemical structures and reactions with station rotations. At each station, students will research the structure of carbs, proteins, fats, water, vitamins, and minerals and test their reactions to acids, bases, and heat. Students record their findings and discuss them as a class.	**Math:** Determine the amount of reactants needed to produce a desired amount of a food product **Science:** Students analyze and compare the molecular structure of different types of organic (carbohydrates, proteins, fats) and inorganic molecules (water, vitamins, minerals). Students analyze the response of the different molecular structures within a given reaction. Students explore the different types of chemical reactions. **ELA:** Use the writing process: planning, revising, editing, and rewriting to	Examples of macromolecules, acids, and bases Lab equipment Measuring equipment, including thermometers Graphic organizer Lab report template

			create a focused composition for a specific purpose and audience. **Social Studies:** Choose one core chemistry concept when it comes to the chemical composition of food and research the discovery of that element.	
Analyze chemical structures and reactions of various foods to identify and categorize elements, compounds, and mixtures. Students will be able to analyze chemical structures and reactions of various foods to explain formulas, and chemical and physical changes.	**Formative**: Guided notes, lab planning **Summative**: Lab reports	Explain the most common reactions used in food production with lecture and guided notes. Students predict how these reactions affect the flavor, texture, and appearance of finished food products. Test one or more of the reactions described in the lecture in the lab. Students complete a lab report as they conduct the experiment, predict the outcome of the experiment, and record the results. Students will work in small groups to develop an experiment based on the common reactions covered in the lecture and notes. Each group will exchange experiments with another group. As they conduct the experiment they will record	**Math:** Analyze the chemical compounds responsible for flavor and aroma in foods. **Science:** Students explore the different types of chemical reactions that occur in cooking and baking. Students infer how the physical properties of the products are altered as a result of these reactions. Students use experimental design to explore hypotheses related to chemical reactions in cooking and baking.	Guided notes template Lab equipment Lab report template

		their findings in a lab report. Students will present their data to the class. Lab Opportunities: ● Heterogeneous vs Homogeneous mixtures ● Pure Substances and Compounds		
Define and describe solutions, colloids, solids, gels, foams, and emulsions. Identify and describe how solutions, colloids, solids, gels, foams, and emulsions are employed in the preparation of food.	**Formative:** Vocabulary game, recipe creation, lab planning **Summative**: Recipe presentations	Students will define colloids, gels, foams, emulsions, solutions, and solids. Review vocabulary with a scavenger hunt/ breakout box. Students will work in small groups to identify an example of their assigned term. Then, students will find or create a recipe for their assigned term. Students will produce the food item from their recipe in small groups, then present it to the class. Each student will report on the applications and characteristics of each term. Lab Opportunities:	**Math:** Create a table or graph to organize and categorize key terms. **Science:** Students identify different types of solutions formed when different states of matter are combined (colloids, gels foams, emulsions, solids, etc.). **ELA:** Use context clues to determine the meaning of unfamiliar words and phrases. **Social Studies:** Create multiple recipes with a group, ensure that various terminology is used in the report.	Scavenger hunt or breakout box Recipe template Lab equipment

		• Foams • Gastronomy • Gelatins • Salad dressings and Mayonnaise • Gravies		
Examine and identify the impact of pH variance on enzyme function from data gathered during practical experimentation.	**Formative**: pH measurement practice, lab planning **Summative**: Lab report	Define enzymes and pH. Measure pH in a variety of substances using multiple methods. Experiment with enzymatic browning and pH–apples in lemon juice, water, water with baking soda, and vinegar. Students complete a lab report summarizing experiment results.	**Math:** Use percentages and decimals to analyze ph variance on enzyme function **Science:** Students identify certain chemical properties of substances such as pH. Students explore proteins that affect the timing of chemical reactions such as enzymes. **ELA**: Using precise vocabulary, write (lab report) explanations that examine complex ideas and processes.	pH testing strips Digital pH meter Lab equipment Lab report template
Compare and contrast the heat transfer processes of conduction, convection, and radiation. Assess the effect of conduction, convection, and radiation on food.	**Formative**: Mind Meld game, examples of foods cooked by various heat transfer methods, lab planning **Summative**: Experiment design, lab report	Define conduction, convection, and radiation. Practice vocabulary using the Mind Meld game. Students will provide examples of dishes cooked by the different types of heat transfer	**Math:** Use Venn Diagram to compare and contrast the transfer processes of conduction, convection, and radiation. **Science:** Students explore different methods of heat transfer (conduction, convection, radiation) and	Lab equipment Lab report template

		Students will design and participate in an experiment in which the same food product is cooked with each of the heat transfer methods. Students will complete a lab report describing the physical differences in each finished product and predicting how the heat methods might affect other foods.	their applications within cooking. Students use experimental design to test the effects of different types of heat transfer. Social Studies: Research various kitchen instruments that exhibit the heat transfer process of conduction, convection, and radiation. Be sure to include the creation and the social movements that promoted these types of cooking elements.	
Summarize the properties of water and explain the effects of water on food preparation methods.	**Formative**: Guided notes, vocabulary game, vocabulary quiz, lab planning **Summative**: Experiment design, lab report	Define water and its key properties: molecular structure, heat capacity, freezing point, boiling point, role in chemical reactions. Students complete guided notes on these key concepts. Review and deepen understanding with the A to Z vocabulary game. Assess with a vocabulary quiz. Students will design and participate in an experiment that uses steam to cook dishes that typically utilize direct heat methods.	**Math:** Calculate the boiling and freezing point change **Science:** Students explore and define the physical and chemical properties of water. Students use experimental design to test steam-based cooking of different dishes. **ELA:** Review key ideas and details with a focus on newly acquired vocabulary. Using vocabulary, create and outline for an explanatory paragraph.	Guided notes template Chart paper Lab equipment Lab report template

		Students will complete a lab report on their findings.		

Key Vocabulary

nucleus, proton, electron, neutron, elements, compounds, heterogeneous mixture, homogeneous mixture, formula, solution, colloid, solid, gel, foam, emulsion, pH scale, base, alkali, acid, neutral, enzyme, conduction, convection, radiation, heat transfer, insulator, conductor, liquid, solid, gas, vapor, steam, boiling point, steam, solvent, sublimate, key ideas and details

Work-Based Learning, Simulated Work Experiences, and Experiential Learning:

Lab experiences

CTSO Connection:

FCCLA STAR Event Food Innovations

Certification/Credential Connection:

ServSafe Food Handler, ServSafe Manager, Food and Beverage–Skills for Success

Topic 4 Title: Biological Macromolecules

Content Standards

8. Compare and contrast the chemical structures of various carbohydrates and describe the ways these structures affect food production.

9. Determine how the chemical structure of fats affects food production.

10. Research and report on the processes of protein denaturation and coagulation and their effects on food production.

Unpacked Learning Objectives

Students know:

- The distinct identifying characteristics of various carbohydrate structures.
- That food production can be affected by the chemical structure of the carbohydrates present.
- The chemical structures of various fats.
- How the chemical structure of fats can impact food production.
- The circumstances under which proteins undergo the process of denaturation and coagulation.
- The effects of denaturation and coagulation on food production.

Students are able to:

- Research and report the distinct chemical structures of various carbohydrates found in food.
- Identify how the structures of various carbohydrates affect food production.
- Summarize the chemical structure of various fats.
- Identify and explain how the selection of various fats can create differing outcomes in food production.
- Explain the process of protein denaturation and coagulation.
- Investigate and explain how protein denaturation and coagulation affects food production.

Students understand:

- Carbohydrates can have various effects on food production based on their chemical structure.
- The selection and use of specific chemically structured fats will create predictable effects in food production.
- Proteins undergo the chemical changes of denaturation and coagulation during food production that impact the final product outcome.

Driving/Essential Question	What factors in the chemical structures of carbohydrates, fats, and proteins can be manipulated in the production of food?

Exemplar High Quality Task	Students conduct an experiment using fats, carbohydrates, or proteins as the variable, report their findings, and use these findings to generate additional hypotheses.

Map of Student Learning by Learning Objective

Unpacked Learning Objective SWBAT	Potential Subtasks for Assessments Formative/Summative	Potential Learning Activities Link to Differentiation Examples	Integrated and Related Academic Content: ELA, Math, Science, and/or Social Studies Concepts and Activities	Equipment, Technology and Materials Equipment List by CTE Cluster Link to Helpful Tech Tools
Research and report the distinct chemical structures of various carbohydrates found in food.	**Formative**: Graphic organizer, class discussion **Summative**: Presentation on the discovery of various carbohydrates found in foods	Station rotation: Provide students with examples of types of carbohydrates at each station. Students research the structure of each carbohydrate and predict how the molecular structure affects the flavor, texture, and appearance of each sample item. Students complete a graphic organizer as they move through each station. Discuss findings from station rotation as a class and clarify any misconceptions or gaps in knowledge.	**Math:** Calculate the carbohydrates found in foods **Science:** Students explore the molecular structure of carbohydrates. Students investigate how the molecular structure affects the physical properties of the molecule. **ELA:** Locate useful, relevant and credible sources to answer questions, and defend a position. **Social Studies**: Create a presentation regarding the discovery of various carbohydrates that are found in foods.	Sample carbohydrates for station rotation Graphic organizer

Identify how the structures of various carbohydrates affect food production.	**Formative**: Class discussion, lab planning **Summative:** Experiment design, lab report	Ask students to predict how each carbohydrate structure would react to heat, acid, oxidation, and water. Students test the hypothesis created in the lab and record their results. Discuss the results of the tests and how the reactions can be used in food production. Lab Opportunities: ● Sugar Crystallization ● Carbohydrates in bread	**Math:** Calculate the amount of carbohydrates in food. **Science:** Students use experimental design to explore how different molecular structures react to particular introduced variables. **ELA:** *Speaking and Listening*-Participate in discussions that evaluate how hypotheses, results, claims, findings, and evidence affect food production.	Sample carbohydrates Lab equipment Lab report template
Summarize the chemical structure of various fats.	**Formative**: Graphic organizer **Summative**:	Lecture and graphic organizer on the chemical structure of fats commonly used in food production and human nutrition.	**Math:** Compare and contrast the chemical structure of various fats.	Graphic organizer
Identify and explain how the selection of various fats can create differing outcomes in food production.	**Formative**: Class discussion, lab planning **Summative**: Lab report, sensory evaluation	Present students with a variety of fats used in food production. Students predict how each fat source will affect the finished product of a baked good. Assign each lab group a different fat source. Students work in their lab	**Math:**Create charts and graphs to contrast differing outcomes in food production. **Science:** Students compare and contrast the physical properties of baked goods when different fat sources are used in preparation.	Sample fat sources Lab equipment Lab report template Sensory evaluation form

		groups to create a baked good, such as muffins or cupcakes, using their assigned fat source. Students record their process and results on a lab report. Students sample each baked good and evaluate the flavor, texture, aroma, and appearance of each product. Class discussion on how the fat used in each recipe affected the finished product.	**ELA:** Utilize results from lab report to write summary paragraphs evaluating the samples Include newly acquired vocabulary. **Social Studies:** Research the findings of fats in food production and how it creates different outcomes.	
Explain the process of protein denaturation and coagulation.	**Formative**: Class discussion **Summative**: Protein structure model, denaturation demonstration	Engage students with a demonstration that uses heat or acid to denature and coagulate proteins, such as using lemon juice to “cook” egg whites and observing the changes in the egg as it continues contact with the acid. Explain the process of denaturation and coagulation. Students create 3-D models of protein structures and demonstrate the process of denaturation and coagulation at various stages of the process.	**Math:** Use decimals and percentages to calculate rates of change when finding the protein denaturation and coagulation. **Science:** Students investigate denaturation and coagulation and their effect on different molecular structures. **Social Studies**: Research the process of protein denaturation and coagulation and how it is used in food production.	Protein and acid sources Class supplies for 3-D models

Investigate and explain how protein denaturation and coagulation affects food production.	**Formative**: Lab planning, class discussion **Summative**: Lab report	Conduct an experiment in the food lab that tests the effect of denaturation and coagulation on food flavor and texture. *Example: Students prepare a meat product using an acidic marinade, heat only, or with heat and an added acid source during the cooking process. Students record their process and results using a lab report.* Class discussion on the results of the lab. Students generate additional hypotheses based on the lab results.	**Math:** Use decimals and percentages to calculate rates of change when finding the protein denaturation and coagulation. **Science:** Students use experimental design to explore how denaturation and coagulation affect the physical properties of foods. **ELA:** Utilize knowledge gained from lab discussion to create a post-discussion summary.	Lab equipment Lab report template

Key Vocabulary

monosaccharide, disaccharide, polysaccharide, complex carbohydrate, sucrose, fiber, starch, lipid, fatty acid, saturated fatty acid, unsaturated fatty acid, mono-unsaturated fatty acid, poly-unsaturated fatty acid, cholesterol, coagulation, denaturation, albumin, amino acid, peptide

Work-Based Learning, Simulated Work Experiences, and Experiential Learning:

Lab experiences

CTSO Connection:

FCCLA STAR Event Food Innovations

Certification/Credential Connection:

ServSafe Food Handler, ServSafe Manager, Food and Beverage–Skills for Success

Topic 5 Title: Food Science Fundamentals

Content Standards

11. Investigate the relationship between the three parts of an emulsion and create temporary, semi-permanent, and permanent food emulsions.

12. Summarize results of experiments testing various leavening agents in baked products, identifying the role of acids, carbohydrates, and water in the chemical processes.

13. Research and report on the roles of food additives, including food preservation, fortification, enrichment, and sensory enhancement.

14. Create various carbohydrate food items and analyze the processes of caramelization, crystallization, and gelatinization.

15. Describe the properties of fats, including fat oxidation, smoke point, and flash point, for saturated and unsaturated fats.

16. Describe the function of proteins in emulsifiers, foams, and gluten formation.
    a. Explain how protein reacts to moist and dry heat cooking methods.

17. Compare and contrast storage and cooking methods, explaining their effects on vitamins and minerals in foods.

Unpacked Learning Objectives

Students know:

- The three parts of an emulsion.
- How the three parts of an emulsion interact to create various colloids.
- The process to create temporary, semi-permanent, and permanent food emulsions.
- The basic chemical characteristics of leavening agents used in baked products.
- The role of acids, carbohydrates, and water in the chemical process of leavening baked products.
- A variety of food additives and how they can be used to preserve, fortify, enrich, and enhance food items.
- The chemical changes that occur when preparing carbohydrate-based foods.
- The processes of caramelization, crystallization, and gelatinization.
- The properties of saturated and unsaturated fats can accurately describe how they oxidize and their smoke point and flash point.
- That the chemical composition of proteins are key components when forming emulsifications, foams, and gluten.
- The reaction of various, specific, protein-based foods to moist and dry heat cooking methods.
- Vitamin and mineral loss can occur during various storage and cooking methods.
- Various methods of storing and cooking foods can have differing effects on vitamin and mineral content.

Students are able to:

- Research and report on the relationship between the three parts of an emulsion.
- Successfully create temporary, semi-permanent, and permanent food emulsions.
- Test various leavening agents in baked products, identifying the role of variable ingredients.
- Interpret and summarize results from experiments testing various leavening agents.
- Outline food additives and explain how they are used in the preservation, fortification, enrichment, and sensory enhancement of foods.
- Prepare a variety of carbohydrate-based foods.
- Identify and outline the chemical processes of caramelization, crystallization, and gelatinization.
- Describe key characteristics of common fats found and used in food preparation.
- Describe how common consumable fats oxidize and the thresholds for their smoke point and flash point.
- Outline the function and role of proteins in the production of emulsifications, foams, and gluten.
- Describe the reaction the protein will have to its selected moist or dry heat methods.
- Outline the preferred methods for storage and cooking of foods to preserve optimal vitamin and mineral content.
- Outline the methods of storage and cooking of foods that lead to greater vitamin and mineral loss.

Students understand:

- Emulsions require specific circumstances and ingredients to create temporary, semi-permanent, and permanent food emulsions.
- Various leavening agents perform best in specific balance with the acids, carbohydrates, and water involved with the chemical process of preparing baked products.
- Food additives are used in the preservation, fortification, enrichment, and sensory enhancement of foods.
- Chemical processes occur when preparing carbohydrate-based foods and can be identified as caramelization, crystallization, and gelatinization.
- Fats are subject to oxidation and have a smoke point and flash point when heated.
- The properties of the fats vary based on its molecular structure.
- Successful creation of emulsifications, foams, and gluten require protein content.
- Proteins have specific reactions to moist and dry heat.
- The intentional application of moist or dry heat can yield proteins with specific sensory characteristics.
- Minimal vitamin and mineral loss requires careful selection of storage and cooking methods.

Driving/Essential Question	How do food professionals apply scientific concepts and processes?
Exemplar High Quality Task	Students develop and conduct various experiments illustrating the science in cooking.

Map of Student Learning by Learning Objective

Unpacked Learning Objective SWBAT	Potential Subtasks for Assessments Formative/Summative	Potential Learning Activities Link to Differentiation Examples	Integrated and Related Academic Content: ELA, Math, Science, and/or Social Studies Concepts and Activities	Equipment, Technology and Materials Equipment List by CTE Cluster Link to Helpful Tech Tools
Investigate the relationship between the three parts of an emulsion. Create temporary, semi-permanent, and permanent food emulsions.	**Formative**: Graphic organizer, sensory evaluation **Summative**: Lab planning, lab report	Present students with a variety of oils, vinegars, and emulsifiers. Inform students of the proportions of each ingredient category needed to create a vinaigrette. Students use a graphic organizer to create a recipe for a vinaigrette using one item from each category with added seasoning of their choice. Students taste-test and review each group's vinaigrette. Ask students to predict whether the vinaigrette will separate over time. Explain the role of emulsifiers in creating temporary, semi-permanent, and	**Math:** Use mathematical approaches to analyze stability, droplet size distribution, and the physical properties of the emulsion. **Science:** Students investigate emulsifiers and the products created when mixing immiscible liquids. **ELA:***Speaking and Listening*- Identify varying perspectives in the discussion and respond by contributing with relevant evidence and commentary. **Social Studies:** Research the creation of oils and the usage throughout the world.	Vinegars, oils, and emulsifiers Graphic organizer Sensory evaluation form Lab report template

		permanent emulsions. Give examples of each type of emulsion. Divide students into groups. Randomly assign each group a permanent, semi-permanent, or temporary emulsion recipe. Students will create their emulsion in the lab and document the process using a graphic organizer. Discuss results of the lab as a class.		
Identify the role of acids, carbohydrates, and water in the chemical processes of leavening baked products. Summarize the results of experiments testing leavening agents in baked products.	**Formative**: Pancake lab, guided notes **Summative**: Experiment development, lab report	Introduce the concept of chemical leavening agents with an experiment. Students are presented with recipes for pancakes. Some recipes contain no leavening agents or reduced quantities of leavening agents. Students will work in groups to execute their recipe and then review the results. Lecture and guided notes on the role of acids, carbohydrates, and water in chemical leavening, providing examples of baked goods using this type of leavening.	**Math:** Use Pie Charts to analyze the results of experiments testing leavening agents in baked products. **Science:** Students use experimental design to test the effects of chemical leavening agents. Students compare and contrast products with varying levels of leavening agent. **ELA:** Use guided notes and graphic organizer documents to create a post-lab summary using vocabulary acquired	Lab equipment Guided notes template Graphic organizer Lab report template

		Students work in small groups to develop an experiment testing chemical leavening agents in baked goods. Students use a graphic organizer to document the steps of the experiment and record the results. Students present their results to the class as a lab report and discuss their findings.	through participation in the lab. **Social Studies**: Research different types of baking dating to Ancient Greece and how it has changed.	
Research food additives to include preservation, fortification, enrichment, and sensory enhancement. Explain the role of food additives in preserving, fortifying, enriching, and enhancing foods.	**Formative**: Taste test, graphic organizer **Summative**: Poster presentation	Present students with a blind taste test of natural and artificial flavors. Students will identify each flavor and guess whether it is naturally derived or artificial. Discuss results. Lecture on food additives. Students complete a graphic organizer identifying the characteristics of common food additives and their uses. Students choose one food additive for further research and create a poster presentation on that food additive, including its history, uses, foods that use	**Math:** Create a table or graph to analyze the results of blind taste test of natural and artificial flavors. **ELA: Speaking and Listening -** Create clear, coherent presentation showing a command of language suitable for the *target audience.* *(*Presentation Rubric) **Social Studies**: Research and create a presentation on the evolution of food preservation.	

		this additive, and pros and cons of the additive.		
Prepare a variety of carbohydrate-based foods. Analyze the chemical changes that occur in carbohydrate food items to identify caramelization, crystallization, and gelatinization.	**Formative**: Carbohydrate categories, graphic organizer, lab planning **Summative**: Lab documentation	Ask students to write the names of carbohydrate-based foods on sticky notes and place them in a central location. Select student volunteers to categorize the foods listed by their structure, contents, and culinary uses. Ask students to define and name the categories created. Discuss the categories created and refine student-generated definitions. Lecture and graphic organizer on carbohydrates in culinary production and chemical changes during the cooking process, including caramelization, crystallization, and gelatinization. Students participate in a series of labs testing these processes, including creating rock candy; making caramel for caramel apples; and gelatinizing filling for lemon meringue pie. Students document the	**Math:** Use decimals and percentages to calculate reaction rates of caramelization **Math:** Graph the relationship between temperature and time to begin the caramelization process. **Science:** Students investigate chemical changes in carbohydrates during different cooking processes. **ELA:** Use precise vocabulary to write an explanation of the chemical changes that occur in food items. Cite credible sources of information or data.	Sticky notes Graphic organizer Lab equipment Lab report template

		process of each of these experiments, noting the time and temperature at which these chemical processes can be observed.		
Accurately describe the chemical properties of fats. Define and explain fat oxidation, smoke point, and flash point for saturated and unsaturated fats.	**Formative**: Class discussion, guided notes, review game **Summative**: Lab documentation, sensory evaluation	Present students with a variety of fats, including saturated and unsaturated. Ask students to identify the similarities and differences in these fats and how they might affect their uses in food production. Lecture and guided notes on the chemical structure of fats, oxidation, smoke point, and flash point. Review lecture concepts with a game Demonstrate concepts in the food lab using different fat sources to create the same food product, such as grilled cheese sandwiches, Students document the time and temperature at which the fat source begins to smoke. Students will conduct a taste-test comparing the flavor and texture of the finished product.	**Math:** Create charts and graphs to compare chemical properties of fats. **Science:** Students investigate the molecular structure of fat molecules and investigate chemical properties (oxidation) and physical properties (smoke point, flash point) of the molecule. **ELA:** Use context clues to determine the meaning of words unfamiliar spoken or written words. **Social Studies**: Compare and contrast the various types of fats. Create a poster and present to the class. **Social Studies**: Compare various popular foods among different social classes in the United States. Evaluate the fat type and content of each food. Create a	Examples or images of various fats Guided notes template Lab equipment Sensory evaluation form Lab report template

		Discuss lab results as a class.	presentation based on the research.	
Describe the functions of proteins in emulsifiers, foams, and gluten formation.	**Formative**: Class discussion, lab planning **Summative**: Lab report, sensory evaluation	Demonstrate the foaming properties of protein by beating egg whites to create a meringue. Ask students to develop a hypothesis that explains how egg whites form a stable foam. Discuss. Explain that proteins denature when beaten, trapping air bubbles and forming a film around them. Discuss how this property of proteins can be used in food production, including gluten formation in baked goods and emulsions. Ask students to identify other food products that use foam formation, gluten formation, or emulsions in their production. Students test foam formation in the lab by creating a food product such as whipped cream, meringue/ pavlova, steamed and frothed milk as a topping for coffee drinks, or souffle. Students document their process in a lab report and evaluate	**Math:** Use Venn DIagram to compare and contrast the functions of proteins in emulsifiers, foams, and gluten formation. **Science:** Students investigate how the molecular structure of egg whites changes as it changes states of matter (liquid to liquid-gas). Students investigate denaturation and its effect on different food products. **ELA/Social Studies:** Give students an article about the history of pavlova. After reading the article, have students write about the controversies surrounding pavlova. Discuss the characteristics of pavlova with students. Give students a venn diagram and have them compare and contrast pavlova characteristics with ballerinas.	Eggs/ egg whites Hand or stand mixer Lab equipment Lab report template Sensory evaluation form

		each group's finished product.		
Explain how protein reacts to moist and dry heat cooking methods. Give examples of various protein-based foods and their reactions to moist and dry cooking methods.	**Formative:** Class discussion, guided notes, lab planning **Summative:** Lab report, sensory evaluation	Present students with images or examples of protein-based foods cooked in a variety of heat transfer methods. Ask students to list the similarities and differences in the texture and flavor of the example foods. Lecture and guided notes on dry- and moist-heat cooking methods commonly used with proteins and how each method affects the structure of the protein molecule. Students test these concepts in the lab by preparing the same protein-based food in a variety of methods (example: preparing chicken breasts in the oven, pan-saute, in an air fryer or convection oven, poached, steamed, and en papillote.) Students document changes in the food product during the cooking process and evaluate each group's finished product using sensory evaluation methods.	**Math:** Predict how food reacts to moist and dry heat during cooking. **Science:** Students will investigate how dry and moist heating methods affect the molecular structure of a protein. **ELA:** Write explanations of cooking methods that convey the process effectively. Choose precise vocabulary, and maintain an organized structure and style. **Social Studies**: Research cooking methods practiced by cultures from various climates. **Science**: Students summarize the effects of Maillard Reaction when cooking proteins.	Images or samples of protein-based foods Guided notes template Lab equipment Lab report template Sensory evaluation form

Compare and contrast storage methods for a variety of vitamin and mineral rich foods. Compare and contrast cooking methods for a variety of vitamin and mineral rich foods. Outline how the storage and cooking methods impact the content and loss of vitamins and minerals in various foods.	**Formative**: Class discussion, graphic organizer, lab planning **Summative**: Sensory evaluation	Present students with images or examples of vitamin-rich foods preserved and stored in a variety of ways, such as canned, frozen, freeze-dried, pickled, or dehydrated. Ask students to predict which method preserves the most vitamins and minerals. Discuss answers and ask students to explain their choices. Continue the discussion by asking students to suggest cooking methods that will retain the nutrients in the example food item. Ask students to elaborate on their answers. Lecture and graphic organizer on common storage and cooking methods and their effect on nutritional content, including the stability of various vitamins and minerals, solubility, and processing. Conduct a lab in which students prepare a nutrient-dense food in a variety of ways (example: preparing a vegetable by	**Math:** Predict how the cooking time may impact the vitamins and minerals in various foods. **ELA:** Use a variety of search tools and research strategies to support an argument on the best way to prepare a nutrient rich dish. **Social Studies:** Research the earliest recorded methods of storing and cooking foods, create a presentation and explain the loss of vitamins and minerals as they are stored.	Images or examples of vitamin-rich foods Graphic organizer Lab equipment Lab report template Sensory evaluation form

		roasting, steaming, poaching, sauteing, and quick-pickling.) Students sample each finished product and evaluate them using sensory evaluation criteria.		

Key Vocabulary

emulsion, emulsifier, stabilize, lecithin, mucilage, leavening, biological leavening, chemical leavening, physical leavening, foaming, fermentation, catalyst, additives, preservatives, fortified, enriched, antioxidant, anti-caking agent, artificial flavor, emulsifier, nitrite, nitrate, sulfite, caramelize, crystallize, gelatinize, absorption, smoke point, flash point, trans fatty acid, oxidation, barrier, stabilizer, coalescence, gliadin, glutenin, shrinkage, coagulation, maillard reaction, water-soluble vitamins, fat-soluble vitamins, oxidation, bioavailability, context clues

Work-Based Learning, Simulated Work Experiences, and Experiential Learning:

Lab experiences

CTSO Connection:

FCCLA Star Event Food Innovations

Certification/Credential Connection:

ServSafe Food Handler, ServSafe Manager, Food and Beverage–Skills for Success

Topic 6 Title: Microbiology of Food

Content Standards

18. Describe irradiation and pasteurization processes and their impact on bacteria during food production.

19. Research and report on microbiological food safety, including beneficial and harmful microorganisms, fermentation, spoilage, and safety practices.

Unpacked Learning Objectives

Students know:

- The processes of irradiation and pasteurization employed in food production.
- The foods that benefit from the irradiation and pasteurization food safety measures.
- How irradiation and pasteurization impact the bacteria content of various foods.
- The various food items and food production processes that are subject to beneficial and harmful microorganisms.
- The correct standard operating procedures for safely managing food items and food production processes involving microorganisms.

Students are able to:

- Explain the processes of irradiation and pasteurization, outlining its efficacy and application.
- Describe the impact irradiation and pasteurization have on the bacteria content of various foods.
- Identify food items and food production processes that are subject to beneficial and harmful microorganisms.
- Outline the standard operating procedure for safely managing food items and food production processes involving microorganisms.

Students understand:

- The research-based scientific processes of irradiation and pasteurization improve the shelf life of various foods while minimizing or eliminating the risks of dangerous bacteria in various food products.
- Beneficial microorganisms in food items and food production processes play a key role, including intentional fermentation.
- Utilizing the correct safety practices minimize harmful microorganisms that may lead to spoilage or contamination.

Driving/Essential Question	How do food scientists keep food safe for consumers?
Exemplar High Quality Task	Students develop and present a social media campaign educating the public about microbiological safety in home kitchens.

Map of Student Learning by Learning Objective

Unpacked Learning Objective SWBAT	Potential Subtasks for Assessments Formative/Summative	Potential Learning Activities Link to Differentiation Examples	Integrated and Related Academic Content: ELA, Math, Science, and/or Social Studies Concepts and Activities	Equipment, Technology and Materials Equipment List by CTE Cluster Link to Helpful Tech Tools
Describe the processes of irradiation and pasteurization, providing examples of common foods that undergo these food safety measures. Explain how irradiation and pasteurization impact bacteria content in various foods and during food production.	**Formative**: Class discussion **Summative**: Poster presentation	Define irradiation and pasteurization. Provide students with images of a variety of foods, including fish and shellfish, dairy products, eggs, grains, juices, and meats. In a central location, create a chart with one side labeled “pasteurization” and the other side labeled “irradiation.” Ask students to sort their example foods into these categories. Which foods are more likely to be irradiated vs. pasteurized? Discuss responses. Pair students with a partner and assign each pair to research either irradiation	**Math:** Use exponential growth models to show how quickly bacteria can grow if proper precautions are not taken during food production. **Science:** Students use empirical evidence to sort food products into groups (irradiated, pasteurized). **ELA:** *Active Listening* Determine through active listening the purpose, credibility, and effectiveness of a speaker by evaluating the tone, organization, content, and verbal and non-verba. Share feedback before the final poster presentation.	Images of a variety of food items Poster board or chart paper Classroom art supplies

		or pasteurization. Students will work with their partner to create a poster presentation designed to inform consumers about these processes and their effect on food products. Students present their posters to the class.		
Investigate microbiological food safety. Outline beneficial and harmful microorganisms including those associated with fermentation and spoilage. Report on the food science industry supported safety practices that minimize risks for food production.	**Formative**: Class discussion, guided notes, lab planning, case study **Summative**: Lab report, social media campaign	Present students with a variety of food items that rely on microbes to produce desired results (i.e. vinegar, soy sauce, kimchi, chocolate, aged cheeses.) Ask students to identify the common element in these food items. Lecture and guided notes on beneficial microorganisms and their use in food production. Students utilize their knowledge of microorganisms in the lab by producing sauerkraut, sourdough starter, or kefir. Students observe their food product throughout the process and document changes in color, texture, and aroma.	**Math:** Predict the shelf life of products by considering factors like temperature, pH, and water **Science:** Students investigate microorganisms and their effects (positive and negative) on food products and the consumer. **ELA:** Apply vocabulary acquired from lecture and guided notes to **Social Studies:** Research various safety practices and the incidents that have caused policies to be put in place. **Social Studies:** Create a presentation about the first safety food practices to be put in place during the early 1900s. Examine how	Samples of fermented food items Guided notes template Lab equipment Lab report template Case studies Student devices with internet access Graphic organizer Classroom art supplies and/ or student devices with internet access

		Organize students into small groups. Assign each group a case study detailing the progress of a food borne illness outbreak. Using clues from the case study and information from a reputable source such as the CDC website, each group should determine the microorganism responsible for the outbreak, the likely source of contamination, and corrective action. Discuss results. Lecture and graphic organizer on microbiological safety in food production. Students use the information recorded in their graphic organizer to create a social media campaign promoting food safety for home cooks. Present completed campaigns to the class and discuss.	those practices changed during various social events.	

Key Vocabulary

irradiation, pasteurization, ionizing radiation, prebiotic, probiotic, fermentation, lactic acid fermentation, alcohol fermentation, acetic acid fermentation, butyric acid fermentation, SCOBY, anaerobic, live cultures, metabolites

Work-Based Learning, Simulated Work Experiences, and Experiential Learning:

Lab experiences

CTSO Connection:

FCCLA STAR Event Food Innovations

Certification/Credential Connection:

ServSafe Food Handler, ServSafe Manager, Food and Beverage–Skills for Success

Topic 7 Title: Food Preservation and Packaging

Content Standards

20. Describe and justify the various forms of commercial food packaging currently in use.
    Example: Explain why lettuce is sold in airtight bags, air permeable wrappers, or unpackaged.

21. Compare and contrast food preservation processes, including canning, dehydrating, freeze drying, and pickling.

Unpacked Learning Objectives

Students know:
- The various forms of commercial food packaging and the purpose they serve in the preservation, distribution, and marketing of various food items.
- The definition and basic processes of canning, dehydrating, freeze drying, and pickling.
- The impact various food preservation processes have on various food products.

Students are able to:
- Correctly identify various forms of commercial food packaging used in items they commonly consume.
- Determine the possible advantages and disadvantages of specific packaging forms when used for a variety of food items.
- Outline the basic processes of canning, dehydrating, freeze drying, and pickling.
- Describe the impact canning, dehydrating, freeze drying, and pickling have on various food products.

Students understand:
- Commercial food packaging can be selected to improve its shelf life, ease of distribution, cost, and marketability.
- Food professionals select various food preservation processes to yield food products with specific outcomes.

Driving/Essential Question	How does food preservation affect the flavor, texture, and appearance of food products? What factors do food producers consider when designing product packaging?
Exemplar High Quality Task	Students develop a package design for an original food product and explain its role in maintaining food freshness and safety.

Map of Student Learning by Learning Objective

Unpacked Learning Objective SWBAT	Potential Subtasks for Assessments Formative/Summative	Potential Learning Activities Link to Differentiation Examples	Integrated and Related Academic Content: ELA, Math, Science, and/or Social Studies Concepts and Activities	Equipment, Technology and Materials Equipment List by CTE Cluster Link to Helpful Tech Tools
Define the forms of commercial food packaging currently in use and approved by state and federal regulations. Identify common food items that utilize a variety of packaging forms. Explain the purpose of specific packaging selections as applied to specific food items.	**Formative**: Graphic organizer **Summative**: Food packaging design	Present students with examples of food packaging (i.e. cans, jars, resealable bags, boxes, single-use trays.) Students generate hypotheses about why foods are packaged using differing methods. Lecture on food packaging regulations, key developments, and standards. Students use a graphic organizer to record key points. Food packaging challenge: Students generate a concept for a new food item. Using the information from their graphic organizer, students develop a package for their food item. Students build	**Math:** Estimate the cost of food packing options. **Science:** Students use engineering practices to design and build a prototype of food packaging that fits a given set of constraints. **ELA:** Integrate vocabulary that is both formal and suitable for a professional audience or workforce stakeholders into presentation of packaging prototype **Social Studies:** Compare and contrast the various forms of food packaging by state and federal regulations. Create a	Food packaging examples Graphic organizer Template/ guidelines for food product development Classroom supplies for food packaging design and prototype

		and present a prototype of their product packaging and explain how this packaging maintains food safety and quality.	presentation with their findings.	
Define various food preservation processes, including canning, dehydrating, freeze drying, and pickling. Identify the impact of canning, dehydrating, freeze drying, and pickling on various food products.	**Formative**: Sensory evaluation **Summative**: Research essay	Present students with samples of a single food product preserved in a variety of ways (i.e. green beans pickled, canned, freeze-dried, and dehydrated.) Students compare the flavor, texture, and appearance of each preservation method and discuss which method would be preferable to them and why.	**Math:** Create a table, chart or graph to calculate and record the elapsed time in canning, dehydrating, freeze drying, and pickling. **Science:** Students compare and contrast physical properties of foods prepared using different preservation methods. **Social Studies:** Research the history of food preserving processes, write an essay about the different kinds of preservation processes.	Images or samples of preservation methods Sensory evaluation form

Key Vocabulary

vacuum sealed, aseptic packaging, blister packaging, controlled atmosphere packaging, modified atmosphere packaging, shrink wrap, canning, water-bath canning, pressure canning, dehydrating, freeze dry, pickle

Work-Based Learning, Simulated Work Experiences, and Experiential Learning:

Lab experiences

CTSO Connection:

FCCLA STAR Event Food Innovations

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ServSafe Food Handler, ServSafe Manager, Food and Beverage–Skills for Success