Human Services Career Cluster Food Science Course Number: 20.41810

Course Description:

Food science integrates many branches of science and relies on the application of the rapid advances in technology to expand and improve the food supply. Students will evaluate the effects of processing, preparation, and storage on the quality, safety, wholesomeness, and nutritive value of foods. Building on information learned in Nutrition and Wellness and Chemistry, this course illustrates scientific principles in an applied context, exposing students to the wonders of the scientific world. Related careers will be explored.

Career Standard 1

HUM-FS-1

The following standard is included in all CTAE courses adopted for the Career Cluster/Pathways. Teachers should incorporate the elements of this standard into lesson plans during the course. The topics listed for each element of the standard may be addressed in differentiated instruction matching the content of each course. These elements may also be addressed with specific lessons from a variety of resources. This content is not to be treated as a unit or separate body of knowledge but rather integrated into class activities as applications of the concept.

Standard: Demonstrate employability skills required by business and industry.
The following elements should be integrated throughout the content of this course.

Person-to-Person	Telephone and	Cell Phone and	Communicating At	Listening
Etiquette	Email Etiquette	Internet Etiquette	Work	
Interacting with	Telephone	Using Blogs	Improving	Reasons, Benefits,
Your Boss	Conversations		Communication Skills	and Barriers
Interacting with	Barriers to Phone	Using Social Media	Effective Oral	Listening Strategies
Subordinates	conversations		Communication	
Interacting with	Making and		Effective Written	Ways We Filter
Co-workers	Returning Calls		Communication	What We Hear
Interacting with	Making Cold Calls		Effective Nonverbal	Developing a
Suppliers			Skills	Listening Attitude
	Handling		Effective Word Use	Show You Are
	Conference Calls			Listening
	Handling		Giving and Receiving	Asking Questions
	Unsolicited Calls		Feedback	
				Obtaining Feedback
				Getting Others to
				Listen

1.1 Communicate effectively through writing, speaking, listening, reading, and interpersonal abilities.

Nonverbal Communication	Written Communication	Speaking	Applications and Effective Résumés
Communicating Nonverbally	Writing Documents	Using Language Carefully	Completing a Job Application
Reading Body Language and mixed Messages	Constructive Criticism in Writing	One-on-One Conversations	Writing a Cover Letter
Matching Verbal and Nonverbal communication		Small Group Communication	Things to Include in a Résumé
Improving Nonverbal Indicators		Large Group Communication	Selling Yourself in a Résumé

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Nonverbal Feedback	Making Speeches	Terms to Use in a Résumé
Showing Confidence	Involving the	Describing Your Job Strengths
Nonverbally	Audience	
Showing Assertiveness	Answering Questions	Organizing Your Résumé
	Visual and Media Aids	Writing an Electronic Résumé
	Errors in Presentation	Dressing Up Your Résumé

1.2 Demonstrate creativity by asking challenging questions and applying innovative procedures and methods.

Teamwork and Problem Solving	Meeting Etiquette
Thinking Creatively	Preparation and Participation in Meetings
Taking Risks	Conducting Two-Person or Large Group Meetings
Building Team Communication	Inviting and Introducing Speakers
	Facilitating Discussions and Closing
	Preparing Visual Aids
	Virtual Meetings

1.3 Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.

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Problem	Customer Service	The Application Process	Interviewing	Finding the Right
Solving			Skills	Job
Transferable	Gaining Trust and	Providing Information,	Preparing for an	Locating Jobs and
Job Skills	Interacting with	Accuracy and Double	Interview	Networking
	Customers	Checking		
Becoming a	Learning and	Online Application	Questions to Ask in	Job Shopping
Problem Solver	Giving Customers	Process	an Interview	Online
	What They Want			
Identifying a	Keeping Customers	Following Up After	Things to Include in	Job Search
Problem	Coming Back	Submitting an Application	a Career Portfolio	Websites
Becoming a	Seeing the	Effective Résumés:	Traits Employers	Participation in Job
Critical Thinker	Customer's Point		are Seeking	Fairs
Managing	Selling Yourself and	Matching Your Talents to	Considerations	Searching the
	the Company	a Job	Before Taking a Job	Classified Ads
	Handling Customer	When a Résumé Should		Using Employment
	Complaints	be Used		Agencies
	Strategies for			Landing an
	Customer Service			Internship
				Staying Motivated
				to Search

1.4 Model work readiness traits required for success in the workplace including integrity, honesty, accountability, punctuality, time management, and respect for diversity.

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Workplace	Personal	Employer	Business Etiquette	Communicating at
Ethics	Characteristics	Expectations		Work
Demonstrating	Demonstrating a	Behaviors Employers	Language and	Handling Anger
Good Work Ethic	Good Attitude	Expect	Behavior	
Behaving	Gaining and	Objectionable	Keeping Information	Dealing with
Appropriately	Showing Respect	Behaviors	Confidential	Difficult Coworkers
Maintaining	Demonstrating	Establishing	Avoiding Gossip	Dealing with a
Honesty	Responsibility	Credibility		Difficult Boss
Playing Fair	Showing	Demonstrating Your	Appropriate Work	Dealing with
	Dependability	Skills	Email	Difficult Customers
Using Ethical	Being Courteous	Building Work	Cell Phone Etiquette	Dealing with Conflict
Language		Relationships		

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Showing	Gaining	Appropriate Work
Responsibility	Coworkers' Trust	Texting
Reducing	Persevering	Understanding
Harassment		Copyright
Respecting	Handling	Social Networking
Diversity	Criticism	
Making	Showing	
Truthfulness a	Professionalism	
Habit		
Leaving a Job		
Ethically		

1.5 Apply the appropriate skill sets to be productive in a changing, technological, diverse workplace to be able to work independently and apply team work skills.

Expected Work Traits	Teamwork	Time Management
Demonstrating Responsibility	Teamwork Skills	Managing Time
Dealing with Information Overload	Reasons Companies Use Teams	Putting First Things First
Transferable Job Skills	Decisions Teams Make	Juggling Many Priorities
Managing Change	Team Responsibilities	Overcoming Procrastination
Adopting a New Technology	Problems That Affect Teams	Organizing Workspace and Tasks
	Expressing Yourself on a Team	Staying Organized
	Giving and Receiving Constructive	Finding More Time
	Criticism	
		Managing Projects
		Prioritizing Personal and Work Life

1.6 Present a professional image through appearance, behavior and language.

On-the-Job Etiquette	Person-to-Person Etiquette	Communication Etiquette	Presenting Yourself
Using Professional	Meeting Business	Creating a Good Impression	Looking Professional
Manners	Acquaintances		
Introducing People	Meeting People for the First	Keeping Phone Calls	Dressing for Success
	Time	Professional	
Appropriate Dress	Showing Politeness	Proper Use of Work Email	Showing a Professional
			Attitude
Business Meal		Proper Use of Cell Phone	Using Good Posture
Functions			
Behavior at Work		Proper Use in Texting	Presenting Yourself to
Parties			Associates
Behavior at			Accepting Criticism
Conventions			
International Etiquette			Demonstrating
			Leadership
Cross-Cultural Etiquette			
Working in a Cubicle			

Support of CTAE Foundation Course Standards and Georgia Standards of Excellence L9-10RST 1-10 and L9-10WHST 1-10:

Georgia Standards of Excellence ELA/Literacy standards have been written specifically for technical subjects and have been adopted as part of the official standards for all CTAE courses.

Career Standard 2

HUM-FS-2

Define food science and explore careers in food science.

- 2.1 Define the study of food science and summarize how food products and processing methods have changed in modern history due to contributions of food scientists.
- 2.2 Describe the history of the development of food and food systems emphasizing the transition from hunting and gathering to farming and then to market-based societies.
- 2.3 Analyze how studying food science can benefit one in the future.
- 2.4 Evaluate and list careers in food science and list the educational requirements.

Career Standard 3

HUM-FS-3

Investigate how and why scientific evaluation of foods is conducted.

- 3.1 Identify physical, physicochemical, and chemical techniques used for assessing food quality.
- 3.2 Define sensory evaluation, identify the qualities that make-up the sensory characteristics of food, and explain how taste, aroma and the mouth feel sensations combined to give food their flavor.
- 3.3 Explain what sensory evaluation panels do and conduct a sensory panel using appropriate controls and quantify and analyze the data.
- 3.4 Describe the role of science in the development of new food products and the use of the scientific method.
- 3.5 Identify equipment found in the food science laboratory and how to properly and safely use it.

Career Standard 4

HUM-FS-4

Explore the basic chemistry concepts of food science.

- 4.1 Define and describe the parts of an atom.
- 4.2 Define matter and compare and contrast substances (elements and compounds) and mixtures (homogenous and heterogeneous).
- 4.3 Recognize chemical symbols on the periodic table for common elements found in food and their role as the building blocks for compounds in food.
- 4.4 Describe the formation of compounds via ionic and covalent bonding and the representation of the reactions in balanced chemical equations for simple compounds such as salt and water.
- 4.5 Differentiate between organic and inorganic compounds and classify the major food constituents as organic (carbohydrates, fat, protein, vitamins) or inorganic (water, minerals).
- 4.6 Identify the classes of organic compounds important in food (hydrocarbons, alcohols, aldehydes, ketones, acids and amines) and the characterizing features of their structural formulas.
- 4.7 Define and differentiate between chemical and physical changes during food preparation and preservation.

Career Standard 5

HUM-FS-5

Observe how energy works in food preparation and preservation.

- 5.1 Explain and demonstrate how heat is transferred via conduction, convection and radiation.
- 5.2 Compare the effect of various temperatures on rates of chemical and physical reactions.

Career Standard 6

HUM-FS-6

Examine why water and acidity are important factors in food preparation and preservation.

- 6.1 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).
- 6.2 Describe and demonstrate the functions and identify factors that alter the functional properties of water (addition of solutes such as salt and sugar; atmospheric pressure).
- 6.3 Describe the three states of water and the transition between states, (i.e. phase changes).
- 6.4 Define and differentiate between water content and water activity and relate their importance to food preparation/preservation and storage using representative examples.
- 6.5 List the common sources of water and the common contaminants.
- 6.6 Define acid, base and salt, and identify sensory properties and roles in determining the quality characteristics (color, flavor, texture) and safety of food.
- 6.7 Discuss ionization, using water as an example, and the relationship to the formation of acids and bases.
- 6.8 Describe the pH scale and demonstrate how to measure pH.

Career Standard 7

HUM-FS-7

Summarize why carbohydrates are important in food preparation, preservation, and the nutritional impact on diets.

- 7.1 Identify the functions of carbohydrates.
- 7.2 Define and identify the functions of simple and complex carbohydrates, define monosaccharides and disaccharides, and identify the role and function of sugars in food products.
- 7.3 Compare and contrast starches and non-starch-based polysaccharides and the role as food ingredients.

Career Standard 8

HUM-FS-8

Summarize why lipids are important in food preparation and preservation and the nutritional impact they have on diet.

- 8.1 Identify fats present in food and differentiate between triglycerides, phospholipids, and sterols and stanols.
- 8.2 Describe the structure of saturated, monounsaturated and polyunsaturated fatty acids.
- 8.3 Identify and compare the functional properties of triglycerides classified as monounsaturated, polyunsaturated, saturated and trans and list the advantages and disadvantages of their use in food preparation.
- 8.4 Examine the functions of lipids in food preparation and analyze the nutritional impact of lipids in the diet.
- 8.5 Describe mono and diglycerides and phospholipids and their function as emulsifiers in food products.

Georgia Department of Education October 11, 2013 Page 5 of 7 All Rights Reserved 8.6 List and describe the types and causes of fat degradation and mechanisms used in the control.

Career Standard 9

HUM-FS-9

Summarize why proteins are important in food preparation and preservation and the nutritional impact they have on diet.

- 9.1 Describe the chemical structure and organization of proteins.
- 9.2 Describe the functional roles of protein in food products.
- 9.3 Explain what happens during the denaturation of protein and illustrate how the process occurs using acids, enzymes and salts and mechanical action.
- 9.4 Explain coagulation and apply basic principles of the chemistry to prepare high-protein foods such as eggs, milk and meat products.
- 9.5 Define enzyme, including the nomenclature and mechanism of action, identify factors that control enzymatic activity and discuss examples of positive and negative enzymatic effects in food products.

Career Standard 10

HUM-FS-10

Investigate the sources, and impact of food formulations, preparation and preservation on food constituents important to health.

- 10.1 Differentiate between nutrient and phytochemical and indicate the role of each in promoting health.
- 10.2 List the key vitamins, minerals, and phytochemicals present in food and identify foods that are major sources of each food constituent and their role in promoting health.
- 10.3 Define enrichment/fortification, list ideal characteristics of the food fortified or enriched and discuss the role in meeting nutrient needs of the population.
- 10.4 Differentiate between availability and bioavailability.
- 10.5 Explain the impact of food preparation, food processing and preservation methods on nutrient value and bioavailability of phytochemicals.
- 10.6 Define functional foods and explore types of functional foods currently in the marketplace and the potential to impact health.

Career Standard 11

HUM-FS-11

Investigate the reasons for the use of food additives and food analogs in food preparation and in processed products.

- 11.1 Define food additives, discuss the various purposes of food additives in food products, and identify advantages and disadvantages of their use.
- 11.2 Identify regulations governing the approval and use of food additives and the agencies involved.
- 11.3 Explain the difference between natural and artificial additives.
- 11.4 Define food analog and list the main reasons for their use.
- 11.5 Explore the impact of the use of substitutes for fat, sugar, and salt on product quality characteristics and nutrient content.
- 11.6 Conduct a sensory evaluation of foods with and without food additives/analogs and compile the data and examine the results.

Career Standard 12

HUM-FS-12

Analyze the principles of fermentation.

- 12.1 List the reasons that food is fermented and identify common food products that result from fermentation.
- 12.2 Define probiotics and the relationship to fermented foods and the benefits for gut health.
- 12.3 Differentiate among yeast, bacterial and mold fermentation and identify food products produced for each type of fermentation.
- 12.4 List the factors that impact the growth of single-celled organisms.
- 12.5 Describe the process of pickling and compare and contrast the use of fermentation versus the addition of vinegar to produce cucumber pickles.
- 12.6 Describe the making of a fermented food product, such as vinegar, cheese, yogurt or chocolate.

Career Standard 13

HUM-FS-13

Investigate measures used to produce safe and wholesome food under sanitary conditions.

- 13.1 Discuss the three major types of food contaminants: physical, chemical, and biological.
- 13.2 Differentiate among food borne illness, food spoilage and food sanitation.
- 13.3 List specific microbial organisms that can cause food-borne illness.
- 13.4 Define toxin, pathogen and parasite and differentiate between food intoxication and food infection.
- 13.5 Discuss sanitation and food handling and processing practices used to produce wholesome foods during the processing, preparation, consumption and storage of food.
- 13.6 Describe the common causes of food spoilage and steps to reduce/prevent spoilage.
- 13.7 Identify government agencies in the United States that regulate the food supply.

Career Standard 14

HUM-FS-14

Compare and contrast different food preservation methods and the resultant quality of preserved food.

- 14.1 Describe and provide examples of the continuum of processed foods.
- 14.2 Identify the major functions of packaging used for food products, differentiating between the functions of primary, secondary and tertiary packaging.
- 14.3 Identify common types of packaging materials, and compare and contrast the properties of containers made from different packaging materials and selection criteria.
- 14.4 Discuss reduced oxygen packaging and the effects on product quality and availability of products in the marketplace.
- 14.5 Explain the importance of product pH and final water activity of the processed product to preservation of foods.
- 14.6 Examine the factors to be considered in the selection and use of successful thermalprocessing techniques (canning, freezing and pasteurization) and describe commercial thermal-processing methods.
- 14.7 Examine the processes of curing, dehydration, freeze-drying, and extended shelf life of fresh products (refrigeration, modified atmosphere packaging and irradiation).
- 14.8 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.

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