Georgia CTAE

# Food Science (2013)

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| **Demonstrate employability skills required by business and industry.** HUM-FS-1 | 1 **Communicate effectively through writing, speaking, listening, reading, and interpersonal abilities.** HUM-FS-1.1 |
| | 2 **Demonstrate creativity by asking challenging questions and applying innovative procedures and methods.** HUM-FS-1.2 |
| | 3 **Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.** HUM-FS-1.3 |
| | 4 **Model work readiness traits required for success in the workplace including integrity, honesty, accountability, punctuality, time management, and respect for diversity.** HUM-FS-1.4 |
| | 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.** HUM-FS-1.5 |
| | 6 **Present a professional image through appearance, behavior and language.** HUM-FS-1.6 |
| **Define food science and explore careers in food science.** HUM-FS-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.** HUM-FS-2.1 |
| | 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.** HUM-FS-2.2 |
| | 3 **Analyze how studying food science can benefit one in the future.** HUM-FS-2.3 |
| | 4 **Evaluate and list careers in food science and list the educational requirements.** HUM-FS-2.4 |
| **Investigate how and why scientific evaluation of foods is conducted.** HUM-FS-3 | 1 **Identify physical, physicochemical, and chemical techniques used for assessing food quality.** HUM-FS-3.1 |
| | 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.** HUM-FS-3.2 |

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| | 3 Explain what sensory evaluation panels do and conduct a sensory panel using appropriate controls and quantify and analyze the data. HUM-FS-3.3 |
| | 4 Describe the role of science in the development of new food products and the use of the scientific method. HUM-FS-3.4 |
| | 5 Identify equipment found in the food science laboratory and how to properly and safely use it. HUM-FS-3.5 |
| **Explore the basic chemistry concepts of food science.** HUM-FS-4 | 1 Explore the basic chemistry concepts of food science. HUM-FS-4.1 |
| | 2 Define matter and compare and contrast substances (elements and compounds) and mixtures (homogenous and heterogeneous). HUM-FS-4.2 |
| | 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. HUM-FS-4.3 |
| | 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. HUM-FS-4.4 |
| | 5 Differentiate between organic and inorganic compounds and classify the major food constituents as organic (carbohydrates, fat, protein, vitamins) or inorganic (water, minerals). HUM-FS-4.5 |
| | 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. HUM-FS-4.6 |
| | 7 Define and differentiate between chemical and physical changes during food preparation and preservation. HUM-FS-4.7 |
| **Observe how energy works in food preparation and preservation.** HUM-FS-5 | 1 Explain and demonstrate how heat is transferred via conduction, convection and radiation. HUM-FS-5.1 |
| | 2 Compare the effect of various temperatures on rates of chemical and physical reactions. HUM-FS-5.2 |
| **Examine why water and acidity are important factors in food preparation and preservation.** HUM-FS-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). HUM-FS-6.1 |
| | 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). HUM-FS-6.2 |

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| | 3 Describe the three states of water and the transition between states, (i.e. phase changes). HUM-FS-6.3 |
| | 4 Define and differentiate between water content and water activity and relate their importance to food preparation/preservation and storage using representative examples. HUM-FS-6.4 |
| | 5 List the common sources of water and the common contaminants. HUM-FS-6.5 |
| | 6 Define acid, base and salt, and identify sensory properties and roles in determining the quality characteristics (color, flavor, texture) and safety of food. HUM-FS-6.6 |
| | 7 Discuss ionization, using water as an example, and the relationship to the formation of acids and bases. HUM-FS-6.7 |
| | 8 Describe the pH scale and demonstrate how to measure pH. HUM-FS-6.8 |
| Summarize why carbohydrates are important in food preparation, preservation, and the nutritional impact on diets. HUM-FS-7 | 1 Identify the functions of carbohydrates. HUM-FS-7.1 |
| | 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. HUM-FS-7.2 |
| | 3 Compare and contrast starches and non-starch-based polysaccharides and the role as food ingredients. HUM-FS-7.3 |
| Summarize why lipids are important in food preparation and preservation and the nutritional impact they have on diet. HUM-FS-8 | 1 Identify fats present in food and differentiate between triglycerides, phospholipids, and sterols and stanols. HUM-FS-8.1 |
| | 2 Describe the structure of saturated, monounsaturated and polyunsaturated fatty acids. HUM-FS-8.2 |
| | 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. HUM-FS-8.3 |
| | 4 Examine the functions of lipids in food preparation and analyze the nutritional impact of lipids in the diet. HUM-FS-8.4 |
| | 5 Describe mono and diglycerides and phospholipids and their function as emulsifiers in food products. HUM-FS-8.5 |
| | 6 List and describe the types and causes of fat degradation and mechanisms used in the control. HUM-FS-8.6 |
| Summarize why proteins are important in food preparation and | 1 Describe the chemical structure and organization of proteins. HUM-FS-9.1 |

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| **preservation and the nutritional impact they have on diet.** HUM-FS-9 | 2 **Describe the functional roles of protein in food products.** HUM-FS-9.2 |
| | 3 **Explain what happens during the denaturation of protein and illustrate how the process occurs using acids, enzymes and salts and mechanical action.** HUM-FS-9.3 |
| | 4 **Explain coagulation and apply basic principles of the chemistry to prepare high-protein foods such as eggs, milk and meat products.** HUM-FS-9.4 |
| | 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.** HUM-FS-9.5 |
| **Investigate the sources, and impact of food formulations, preparation and preservation on food constituents important to health.** HUM-FS-10 | 1 **Differentiate between nutrient and phytochemical and indicate the role of each in promoting health.** HUM-FS-10.1 |
| | 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.** HUM-FS-10.2 |
| | 3 **Define enrichment/fortification, list ideal characteristics of the food fortified or enriched and discuss the role in meeting nutrient needs of the population.** HUM-FS-10.3 |
| | 4 **Differentiate between availability and bioavailability.** HUM-FS-10.4 |
| | 5 **Explain the impact of food preparation, food processing and preservation methods on nutrient value and bioavailability of phytochemicals.** HUM-FS-10.5 |
| | 6 **Define functional foods and explore types of functional foods currently in the marketplace and the potential to impact health.** HUM-FS-10.6 |
| **Investigate the reasons for the use of food additives and food analogs in food preparation and in processed products.** HUM-FS-11 | 1 **Define food additives, discuss the various purposes of food additives in food products, and identify advantages and disadvantages of their use.** HUM-FS-11.1 |
| | 2 **Identify regulations governing the approval and use of food additives and the agencies involved.** HUM-FS-11.2 |
| | 3 **Explain the difference between natural and artificial additives.** HUM-FS-11.3 |
| | 4 **Define food analog and list the main reasons for their use.** HUM-FS-11.4 |
| | 5 **Explore the impact of the use of substitutes for fat, sugar, and salt on product quality characteristics and nutrient content.** HUM-FS-11.5 |
| | 6 **Conduct a sensory evaluation of foods with and without food additives/analogs and compile the data and examine the results.** HUM-FS-11.6 |

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| **Analyze the principles of fermentation.** HUM-FS-12 | 1 **List the reasons that food is fermented and identify common food products that result from fermentation.** HUM-FS-12.1 |
| | 2 **Define probiotics and the relationship to fermented foods and the benefits for gut health.** HUM-FS-12.2 |
| | 3 **Differentiate among yeast, bacterial and mold fermentation and identify food products produced for each type of fermentation.** HUM-FS-12.3 |
| | 4 **List the factors that impact the growth of single-celled organisms.** HUM-FS-12.4 |
| | 5 **Describe the process of pickling and compare and contrast the use of fermentation versus the addition of vinegar to produce cucumber pickles.** HUM-FS-12.5 |
| | 6 **Describe the making of a fermented food product, such as vinegar, cheese, yogurt or chocolate.** HUM-FS-12.6 |
| **Investigate measures used to produce safe and wholesome food under sanitary conditions.** HUM-FS-13 | 1 **Discuss the three major types of food contaminants: physical, chemical, and biological.** HUM-FS-13.1 |
| | 2 **Differentiate among food borne illness, food spoilage and food sanitation.** HUM-FS-13.2 |
| | 3 **List specific microbial organisms that can cause food-borne illness.** HUM-FS-13.3 |
| | 4 **Define toxin, pathogen and parasite and differentiate between food intoxication and food infection.** HUM-FS-13.4 |
| | 5 **Discuss sanitation and food handling and processing practices used to produce wholesome foods during the processing, preparation, consumption and storage of food.** HUM-FS-13.5 |
| | 6 **Describe the common causes of food spoilage and steps to reduce/prevent spoilage.** HUM-FS-13.6 |
| | 7 **Identify government agencies in the United States that regulate the food supply.** HUM-FS-13.7 |
| **Compare and contrast different food preservation methods and the resultant quality of preserved food.** HUM-FS-14 | 1 **Describe and provide examples of the continuum of processed foods.** HUM-FS-14.1 |
| | 2 **Identify the major functions of packaging used for food products, differentiating between the functions of primary, secondary and tertiary packaging.** HUM-FS-14.2 |
| | 3 **Identify common types of packaging materials, and compare and contrast the properties of containers made from different packaging materials and selection criteria.** HUM-FS-14.3 |
| | 4 **Discuss reduced oxygen packaging and the effects on product quality and availability of products in the marketplace.** HUM-FS-14.4 |

5 **Explain the importance of product pH and final water activity of the processed product to preservation of foods.** HUM-FS-14.5

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.** HUM-FS-14.6

7 **Examine the processes of curing, dehydration, freeze-drying, and extended shelf life of fresh products (refrigeration, modified atmosphere packaging and irradiation).** HUM-FS-14.7

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.** HUM-FS-14.8