

# Food Science

**The Science of Food: Differentiate the structures, functions, and sources of ingredients and the roles they play in food product development for human nutrition.** 7.1

- 1 Classify components of foods into nutrient categories.** 7.1.1
- 2 Identify sources and forms of energy in foods.** 7.1.2
- 3 Measure and describe the role of pH in food processing and storage.** 7.1.3
- 4 Measure and describe water activity and differentiate how water activity affects food functionality and storage.** 7.1.4
- 5 Describe the composition and structure of sugars, complex carbohydrates, lipids, vitamins, minerals, and proteins.** 7.1.5
- 6 Identify sources of sugars, complex carbohydrates, lipids, vitamins, minerals, and proteins, and their nutritional contributions to dietary needs.** 7.1.6
- 7 Relate the functions and physical properties of simple and complex carbohydrates, lipids, vitamins, minerals, and proteins (i.e., functional ingredients) to the manufacturing of food products.** 7.1.7
- 8 Describe the roles of enzymes as catalysts and the factors that affect enzyme activity.** 7.1.8
- 9 Differentiate the metabolic processes and the factors that affect metabolic changes in the human body, including anabolism, catabolism, and basal metabolism.** 7.1.9
- 10 Identify and describe the functions of food additives in food products.** 7.1.10
- 11 Identify and describe regulations regarding food additives.** 7.1.11
- 12 Identify the characteristics and properties of mixtures and select and apply appropriate chemical or biological separation techniques.** 7.1.12

**Quality Assurance: Inspect the food production process and locate potential sources of food quality and safety deviations in facilities.** 7.2

- 1 Describe the types of spoilage (e.g., oxidation, microbial), their sources and impact.** 7.2.1
- 2 Describe the quality attributes (e.g. color, flavor, texture) that a food product possesses.** 7.2.2
- 3 Identify molds, bacteria, viruses, prions, and yeast and describe their roles in food production.** 7.2.3

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- 4 Identify molds, bacteria, viruses, prions, and yeast and describe how they reproduce and factors that affect their growth. 7.2.4**

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  - 5 Test food quality through chemical, microbiological, sensory, and physical methods. 7.2.5**

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  - 6 Evaluate, inspect, and select raw food products for manufacturing, based on raw ingredient specifications. 7.2.6**

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  - 7 Develop a quality check list, based on finished food product attributes, specifications, and regulations. 7.2.7**

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  - 8 Identify elements commonly included on the principal display and information panels on a food product. 7.2.8**

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  - 9 Compare and contrast food safety, food fraud, and food defense. 7.2.9**

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  - 10 Describe the relationship between timeliness of processing or production to product quality. 7.2.10**

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  - 11 Identify the importance of data collection and management and its relationship to a quality assurance program. 7.2.11**

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  - 12 Record and manage data relevant to a quality assurance program. 7.2.12**
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**Meat Science: Identify the role of inspection, sanitation, food safety, and proper harvesting practices; the role of carcass evaluation and grading on meat quality and percent saleable products and cutting guidelines from primal to retail meat cuts. 7.3**

- 1 Identify the benefits and roles of antemortem inspection in relation to food safety. 7.3.1**

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- 2 Identify the benefits and roles of postmortem inspection in relation to food safety. 7.3.2**

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- 3 Describe humane harvesting techniques and their impact on meat quality. 7.3.3**

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- 4 Remove and inspect offal postmortem for signs of disease or contamination. 7.3.4**

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- 5 Prepare a carcass through species-specific techniques for postmortem inspection. 7.3.5**

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- 6 Describe the role and impacts of the conversion of muscle to meat-on-meat quality. 7.3.6**

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- 7 Evaluate and describe the role of marbling on overall quality grade. 7.3.7**

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- 8 Evaluate retail cuts of meat to determine both quality and economic value. 7.3.8**

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- 9 Determine the maturity of an animal using skeletal ossification and lean maturity ratings and determine those impacts on the overall quality grade per USDA grading. 7.3.9**

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- 10 Calculate the percentage of saleable products from yield grades utilizing the USDA formula in estimating percent boneless closely trimmed retail cuts. 7.3.10
  - 11 Calculate beef carcass value using a grid-based marketing system. 7.3.11
  - 12 Fabricate carcasses into species-specific wholesale and retail cuts. 7.3.12
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**Food Production and Processing: Process a safe shelf stable food product for distribution and consumption.** 7.4

- 1 Describe the processes used in food preservation, control the variables, and apply biological processing methods. 7.4.1
  - 2 Describe the process of dehydration and concentration, control the variables that affect the quality of dried foods and apply the methods. 7.4.2
  - 3 Describe the functions and types of packaging operations, equipment, and materials and use them to manufacture food products (e.g., metal, glass, paper, plastic, film, laminates, edible coatings, biodegradable). 7.4.3
  - 4 Process food through mixing, grinding, pumping, and washing, and describe the physical change in the food product. 7.4.4
  - 5 Identify and apply food grading systems and standards of identity. 7.4.5
  - 6 Compare and contrast storage and distribution methods for shelf-stable and non-shelf-stable products. 7.4.6
  - 7 Differentiate among beneficial microorganisms (e.g., bacteria, mold, yeast) and their uses in food production. 7.4.7
  - 8 Process food products through biological processing. 7.4.8
  - 9 Describe the role of enzymes as catalysts and factors that affect enzyme activity in the fermentation process. 7.4.9
  - 10 Determine the environmental impacts and manage the waste of processing a food product. 7.4.10
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**Food Product Development: Apply principles of nutrition and human behavior to create a new food prototype.** 7.5

- 1 Conduct a sensory evaluation of food products. 7.5.1
- 2 Identify consumer preferences, trends, and opportunities affecting food product development. 7.5.2
- 3 Manipulate ingredients to meet a desired product goal. 7.5.3
- 4 Identify nutrient values, serving sizes, and nutrient variability for a food product. 7.5.4
- 5 Calculate the amounts of restricted ingredients in food products. 7.5.5
- 6 Develop a food product package and label according to industry standards. 7.5.6

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**7 Estimate the shelf life and potential changes in attributes over time. 7.5.7**

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**8 Create a new product roll out plan (e.g., concept, bench trial, market assessment, industrial trial, consumer acceptance). 7.5.8**

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**Food Safety and Sanitation: Describe a food safety and sanitation plan, addressing processing facility needs and contamination points. 7.6**

**1 Identify and control food product allergens. 7.6.1**

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**2 Establish and implement procedures for preoperational inspection and cleaning. 7.6.2**

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**3 Identify the sources and most prevalent types of food borne bacteria and pathogens to account for the potential of their entrance into the food supply. 7.6.3**

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**4 Describe good manufacturing practices and the correlating corrective actions. 7.6.4**

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**5 Identify and describe foodborne hazards. 7.6.5**

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**6 Identify and describe points in production where food safety hazards can be controlled. 7.6.6**

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**7 Identify and describe critical limits. 7.6.7**

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**8 Identify and describe a corrective active plan. 7.6.8**

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**9 Identify the key activities (e.g., recall exercise, regulatory notification) of a recall program. 7.6.9**

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**10 Identify the government agencies involved in the regulation and governance of food production. 7.6.10**

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**11 Compare and contrast food security and food defense. 7.6.11**

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**12 Identify sources of physical, biological, radiological, and chemical tampering points. 7.6.12**

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**13 Manage the biosecurity of raw materials and finished products during transportation. 7.6.13**

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