Idaho CTE

Food Science and Nutrition (2004)

EXPLORE THE WORLD OF FOOD AS A SCIENCE 1FS

1.01 DESCRIBE THE SCIENTIFIC STUDY OF FOODS 1.01FS

1. Explain food science and describe the main goal of food scientists 1.01FS1
2. Explain the interrelationship of food science to other sciences 1.01FS2
3. Explain the interrelationship of food science to nutrition 1.01FS3

1.02 EXPLAIN THE BASIC CONCEPTS OF NUTRITION 1.02FS

1. Describe food sources, food nutrients and food groups 1.02FS1
2. Explain the food guide pyramid 1.02FS2
3. Describe the dietary needs of humans 1.02FS3
4. Explain the purpose of the six main dietary nutrient groups 1.02FS4
5. Explain the consequences of an unbalanced diet 1.02FS5
6. Compare nutrient rich foods to nutrient poor foods 1.02FS6

1.03 DEMONSTRATE METHODS AND CONSIDERATIONS REQUIRED IN THE SCIENTIFIC EVALUATION OF FOODS 1.03FS

1. Explain the steps in the scientific method relative to food sciences 1.03FS1
2. Identify the basic units of measurement: standard and metric 1.03FS2
3. Explain areas, weight, volume, mass, and density 1.03FS3
4. Explain the use of scientific equipment found in the food science laboratory 1.03FS4
5. Explain the collection, organization and evaluation of data 1.03FS5
6. Describe methods to analyze food mixtures, food microbiology, food fermentation, and food preservation 1.03FS6
7. Describe equipment and methods used to measure, record, graph, and report food science experimental data 1.03FS7
8 Demonstrate the proper use and care of scientific equipment 1.03FS8
9. Explain safety guidelines in the laboratory 1.03FS9
10. Write accurate and complete reports of food science experiments 1.03FS10

Skip to main content

EXPLORE CHEMISTRY IN FOOD SCIENCE 2FS

2.01 EXPLORE CHEMISTRY AS A SCIENCE OF MATTER 2.01FS

1. Define matter and mass 2.01FS1
2. Describe the six areas of study in chemistry and those related to food science 2.01FS2
3. Explain chemical symbols 2.01FS3
4. Interpret symbols, formulas, and equations 2.01FS4
5. Explore methods of measuring mass 2.01FS5
6. Describe the method of classification used in the scientific method 2.01FS6
7. Describe the four physical states of matter 2.01FS7
8. Compare pure substances to mixtures 2.01FS8
9. Compare pure substances to elements and compounds 2.01FS9
10. Compare heterogeneous mixtures to homogeneous mixtures 2.01FS10
11. Compare the classification of compounds 2.01FS11
12. Compare the classification of compounds 12. Demonstrate means of determining pH 2.01FS12
13. Demonstrate boiling point, freezing point, and volatility 2.01FS13

2.02 EXPLORE THE STRUCTURE OF ATOMS, ELEMENTS, AND MOLECULES 2.02FS

1. Examine the structure of atoms and molecules 2.02FS1
2. Compare elements, compounds, and mixtures 2.02FS2
3. Compare extensive properties to intensive properties 2.02FS3
4. Compare physical properties to chemical properties 2.02FS4
5. Define a chemical reaction 2.02FS5
6. Distinguish between the reactants and the products in a chemical reaction 2.02FS6
7. Describe the transfer of energy in physical and chemical changes 2.02FS7

2.03 USE THE PERIODIC TABLE 2.03FS

1. Describe the organization of the periodic table 2.03FS1
2. Demonstrate locating names and symbols of elements on the periodic table 2.03FS2
3. Explain how to locate metals, nonmetals, and metalloids 2.03FS3
4. Explain Dalton's Atomic Theory 2.03FS4
5. Define nucleus, electron, proton, and neutron 2.03FS5
6. Explain the relationship between electron configuration and the arrangement of elements in groups, blocks, and periods 2.03FS6
7. Calculate atomic number 2.03FS7
8. Calculate mass number 2.03FS8

Skip to main content

9. Define isotope 2.03FS9
10. Explain superscript and subscript information in the nuclear symbol 2.03FS10
11. Define mole 2.03FS11
12. Explain Avogadro's Number 2.03FS12
13. Explain the concept of molar mass 2.03FS13
14. Identify elements commonly found in foods 2.03FS14

2.04 EXPLORE THE FORMATION OF COMPOUNDS THROUGH CHEMICAL BONDING IN FOODS 2.04FS

1. Explain chemical bonding 2.04FS1
2. Compare ionic bonding with covalent bonding 2.04FS2
3. Explain electro-negativity differences to chemical bonding 2.04FS3
4. Describe chemical stability 2.04FS4
5. Describe the effect of chemical bonding on the physical properties of compounds commonly found in food 2.04FS5

2.05 EXPLORE REACTIONS OF CHEMICALS COMMONLY FOUND IN FOOD 2.05FS

1. Describe various types of chemical reactions as they pertain to food 2.05FS1
2. Illustrate the effect of a chemical reaction with an equation 2.05FS2
3. Demonstrate examples of chemical reactions as they pertain to food 2.05FS3

2.06 EXPLORE CURRENT THEORIES ABOUT ATOMIC STRUCTURE, ENERGY LEVELS, SUBLEVELS, AND ORBITALS 2.06FS

1. Review the evolution of atomic theory 2.06FS1
2. Describe emissions spectra of atomic electron configurations 2.06FS2
3. Describe examples of energy sublevels and orbitals in the atoms of elements commonly found in food 2.06FS3

EXPLORE THE APPLICATION OF FOOD SCIENCE AND NUTRITION 3FS

3.01 EXPLORE THE SENSORY EVALUATION OF FOOD 3.01FS

1. Describe factors affecting individual food preferences 3.01FS1
2. Explain sensory characteristics of food 3.01FS2
3. Describe the effects of physical and chemical changes in foods 3.01FS3
4. Analyze the properties of acids and bases 3.01FS4
5. Describe ways that pH is related to food properties, safety, and freshness 3.01FS5
6. Explain the importance of pH in digestion 3.01FS6
7. Determine the pH of common foods 3.01FS7
8. Describe how food sensory evaluations are conducted 3.01FS8

Skip to main content

9. Conduct and report the results of a food sensory evaluation 3.01FS9

3.02 DESCRIBE THE PHYSICAL AND CHEMICAL CHARACTER- ISTICS OF ENERGY AND THEIR RELATIONSHIP TO FOODS 3.02FS

1.. Define energy 3.02FS1
2. Compare physical changes to chemical reactions 3.02FS2
3. Relate molecular motion to temperature 3.02FS3
4. Describe how heat is transferred 3.02FS4
5. Compare heat of fusion to heat of vaporization 3.02FS5
6. Define phase change 3.02FS6
7. Describe the relationship between food intake and body weight 3.02FS7
8. Describe how the human body uses energy derived from food components 3.02FS8

3.03 DESCRIBE THE PROPERTIES OF WATER AND THEIR IMPORTANCE TO THE HUMAN BODY AND FOOD PREPARATION 3.03FS

1. Describe the chemical composition of water 3.03FS1
2. Describe hydrogen bonds and how they differ from covalent bonds 3.03FS2
3. Compare hard water to soft water 3.03FS3
4. Describe the functions of water in food preparation 3.03FS4
5. Explain the functions of water in the body 3.03FS5

3.04 EXPLORE THE SOURCES AND USES OF CARBOHYDRATES IN FOOD SCIENCE 3.04FS

1. Identify the chemical structure of simple and complex carbohydrates 3.04FS1
2. Explain the functions of sugar, starch, and pectin in food systems 3.04FS2
3. Identify sources of carbohydrates 3.04FS3
4. Explore the uses of carbohydrates in food preparation 3.04FS4
5. Explain the effects of carbohydrates on metabolism and the human body 3.04FS5

3.05 EXPLAIN THE EFFECTS OF LIPIDS IN FOOD SCIENCE 3.05FS

1. Define lipid 3.05FS1
2. Describe the properties of lipids 3.05FS2
3. Compare the properties of saturated and unsaturated fatty acids 3.05FS3
4. Describe the functions of fat in the body 3.05FS4
5. Explain the functions of fat in food preparation 3.05FS5
6. Explain the relationship of fats to health issues 3.05FS6

Skip to main content

3.06 EXPLORE THE SOURCES, CHEMICAL CHANGES, AND IMPORTANCE OF PROTEINS IN FOOD SCIENCE 3.06FS

1. Define protein 3.06FS1
2. Distinguish between the three types of proteins 3.06FS2
3. Identify chemical elements that are common to all proteins 3.06FS3
4. Describe the chemical structure of amino acids 3.06FS4
5. Explain the denaturization of protein and how the process occurs 3.06FS5
6. Describe how protein is used in food preparation 3.06FS6
7. Describe the composition of eggs, egg storage and cooking 3.06FS7
8. Explain the functions of protein in the body 3.06FS8
9. Compare and contrast complete and incomplete protein 3.06FS9

3.07 EXPLAIN THE IMPORTANCE OF VITAMINS AND MINERALS IN FOOD SCIENCE 3.07FS

1. Define vitamin 3.07FS1
2. Explain the major categories of vitamins and their food sources 3.07FS2
3. Distinguish between water-soluble and fat-soluble vitamins 3.07FS3
4. Describe the major functions of vitamins and vitamin groups 3.07FS4
5. Define mineral 3.07FS5
6. Identify the chemical elements that make up minerals required for human health and nutrition 3.07FS6
7. Distinguish between major and trace minerals and list examples in each category 3.07FS7
8. Describe the food sources of minerals 3.07FS8
9. Explain the consequences of vitamin and mineral deficiencies and excesses 3.07FS9
10. Explain interrelationships among nutrients 3.07FS10
11. Explore the effects of heat, light, and pH on the stability of vitamins and minerals 3.07FS11

3.08 EXPLORE THE PROCESSES OF METABOLISM 3.08FS

1. Define metabolism 3.08FS1
2. Describe metabolism in terms of anabolism and catabolism 3.08FS2
3. Describe the conditions needed for the process of metabolism 3.08FS3
4. Explain basal metabolism 3.08FS4
5. Explain how voluntary activities affect the need for kilocalories 3.08FS5
6. Describe factors that affect metabolic changes to the human body 3.08FS6

Skip to main content

7. Explain why lactic acid builds up in muscles during various activities 3.08FS7

DEMONSTRATE CHEMICAL PROCESSES INVOLVED IN FOOD PREPARATION 4FS

4.01 EXPLORE THE AFFECTS OF ENZYME REACTIONS ON FOOD 4.01FS

1. Define enzyme 4.01FS1
2. Define substrate 4.01FS2
3. Explain the relationship of an enzyme to a substrate 4.01FS3
4. Compare enzyme and coenzyme 4.01FS4
5 Describe factors that affect enzyme activity in the process of digestion 4.01FS
6. Describe the uses of enzymes in food preparation 4.01FS6
7. Demonstrate the effects of enzymes in food preparation 4.01FS7

4.02 EXAMINE THE CHEMICAL PROPERTIES AND USES OF SOLUTIONS, COLLOIDAL DISPERSIONS, AND EMULSIONS IN FOOD PREPARATION 4.02FS

1. Define solution 4.02FS1
2. Identify solvent and solute in a solution 4.02FS2
3. Examine the properties of colloidal dispersions 4.02FS3
4 Define emulsifier 4.02FS4
5. Identify examples of gels, foams and emulsions 4.02FS5
6. Describe the uses of gels, foams and emulsions in food preparation 4.02FS6
7. Compare dispersed phase to continuous phase 4.02FS7
8. Describe three parts of an emulsion 4.02FS8
9. Examine various food emulsions 4.02FS9
10. Calculate a solution concentration 4.02FS10
11. Describe the process of homogenization 4.02FS11
12. Compare a saturated solution to a solution that is unsaturated or super-saturated 4.02FS12

4.03 DEMONSTRATE THE CHEMICAL PROCESSES INVOLVED IN LEAVENING 4.03FS

1. Define leavening agent 4.03FS1
2. Describe four major leavening agents and their properties 4.03FS2
3. Demonstrate how air and steam operate as leavening agents 4.03FS3
4. Describe the properties of yeast as a leavening agent 4.03FS4
5. Demonstrate the difference between quick breads and yeast breads 4.03FS5
6. Explain the chemical reactions in the leavening process 4.03FS6
7. Compare the effects of chemical and natural leavening agents on baked products 4.03FS7

Skip to main content

4.04 DEMONSTRATE THE PROCESS OF FERMENTATION AS IT APPLIES TO THE SCIENCE OF FOOD 4.04FS

1. Describe the process of cell respiration 4.04FS1
2. Distinguish between aerobic and anaerobic respiration 4.04FS2
3. Explain three reasons for fermenting foods 4.04FS3
4. Describe three types of bacteria that are involved in food fermentation 4.04FS4
5. Explain the role molds and enzymes play in fermentation 4.04FS5
6. Distinguish between indigenous bacteria and non-indigenous bacteria 4.04FS6
7. Demonstrate the purpose of lactobacillus in the process of fermentation 4.04FS7
8. Demonstrate the scientific method in an experiment involving fermentation 4.04FS8

4.05 EXPLORE THE IMPORTANCE AND USES OF THE MILK FOOD GROUP IN FOOD SCIENCE 4.05FS

1. Describe the chemical composition of milk 4.05FS1
2. Demonstrate the process of creaming 4.05FS2
3. Distinguish between various milk products 4.05FS3
4. Describe the chemical changes in milk as it is heated 4.05FS4
5. Explain pasteurization 4.05FS5
6. Explain milk coagulation 4.05FS6
7. Demonstrate the scientific method in an experiment related to coagulating milk 4.05FS7

EXAMINE MICROBIOLOGY IN FOOD PROCESSING AND PREPARATION 5FS

5.01 EXPLAIN THE CAUSES OF FOOD-BORNE ILLNESSES AND PROCEDURES FOR PREVENTION 5.01FS

1. Describe the types of micro-organisms 5.01FS1
2. Explain the consequences of failure to maintain food safety and food quality 5.01FS2
3. Describe the role of micro-organisms in food contamination and spoilage 5.01FS3
4. Describe the environment required by various micro-organisms involved in food contamination 5.01FS3
5. Define toxin, pathogen, and parasite 5.01FS5
6. Explain food infection, food intoxication, and toxicoinfections 5.01FS6
7. Describe common food-borne illnesses that are associated with improper handling, storage, and processing 5.01FS7
8. Differentiate between cleaning and sanitizing 5.01FS8

Skip to main content

9. Demonstrate procedures used to prevent food-borne illnesses 5.01FS9
10. Describe the role of government and agencies in promoting food safety 5.01FS10
11. Demonstrate the scientific method in an experiment related to food contamination/ food safety 5.01FS11

5.02 DEMONSTRATE THE PURPOSE AND PROCEDURES FOR FOOD FREEZING, DEHYDRATION, AND RE-HYDRATION 5.02FS

1. Explain why fermentations preserve foods 5.02FS1
2. Explain the purposes of dehydration 5.02FS2
3. Compare the equipment used in home and commercial dehydration processes 5.02FS3
4. Compare the nutritional value of dehydrated foods to fresh foods 5.02FS4
5. Explain pre-treating food before dehydration 5.02FS5
6. Illustrate four different methods of dehydration 5.02FS6
7. Demonstrate methods for storing dehydrated food products 5.02FS7
8. Explain re-hydration 5.02FS8
9. Explore the role of blanching in freezing vegetables 5.02FS9
10. Explore factors that affect the storage of frozen foods 5.02FS10

5.03 DEMONSTRATE THE PURPOSE AND SAFE PROCEDURES FOR CANNING 5.03FS

1. Explain the purpose of canning 5.03FS1
2. Distinguish between the different methods of canning 5.03FS2
3. Compare the equipment used in commercial canning to home canning 5.03FS3
4. Compare the nutritional value of canned foods to fresh foods 5.03FS4
5. Describe safe food handling during canning 5.03FS5
6. Demonstrate the scientific method in an experiment related to destroying bacteria during the canning process 5.03FS6

Skip to main content

5.04 EXAMINE FOOD ADDITIVES 5.04FS

1. Define food additives and preservatives 5.04FS1
2. Describe advantages and disadvantages of using food additives and preservatives 5.04FS2
3. Describe the process of food irradiation and its effects on food 5.04FS3
4. Explain the purpose of the Pure Food and Drug laws 5.04FS4
5. Explain the purpose of the GRAS list 5.04FS5
6. Explore sources of information on food additives 5.04FS6
7. Demonstrate the scientific method in a sensory evaluation of foods with and without food additives 5.04FS7

EXPLORE CAREER, TECHNOLOGY, AND CONSUMER EDUCATION IN FOOD SCIENCE AND NUTRITION 6FS

6.01 ANALYZE CAREER PATHS IN FOOD SCIENCE AND NUTRITION 6.01FS

1. Explore the employment and career opportunities associated with food science and nutrition 6.01FS1
2. Explore emerging careers in food science and biotechnology 6.01FS2
3. Identify entry level, technical level, and professional level careers in food science and nutrition 6.01FS3
4. Describe the transferable skills that support employment and careers in food science and nutrition 6.01FS4
5. Explore education and training required for careers in food science and nutrition 6.01FS5
6. Describe additional career paths open to individuals with post-secondary degrees in food science and nutrition 6.01FS6

6.02 EXPLORE EMERGING TRENDS, RESEARCH, AND THE IMPACT OF TECHNOLOGY ON THE FOOD SCIENCE AND NUTRITION INDUSTRY 6.02FS

1. Describe the benefits of various technological advances on the scientific study, processing, and preparation of food products 6.02FS1
2. Describe examples of emerging technologies that may impact the food science and nutrition industry and careers 6.02FS2
3. Explore food science and nutrition industry efforts to use resources more effectively 6.02FS3
4. Explore new types of food products 6.02FS4
5. Explore reengineered food products 6.02FS5
6. Examine food packaging technology 6.02FS6

6.03 EXAMINE CONSUMER EDUCATION ISSUES IN FOOD SCIENCE AND NUTRITION 6.03FS

Skip to main content

1. Describe food labels and their value to consumers 6.03FS1

2. Explore the effective use of resources in providing for nutritional needs of individuals 6.03FS2
3. Evaluate advertising for food products, health foods, and supplements 6.03FS3
4. Investigate facts and fallacies regarding food products and supplements 6.03FS4