

<USING THIS DOCUMENT>

Food Science Crosswalk to the Missouri GLEs

The crosswalks for the Grade Level Expectations (GLEs) provided in this document are organized based on the Strand Legend provided below. Additionally, a GLE Legend is provided at the bottom of each page of the crosswalk. The GLE coding is organized by a letter and number system that indicates the primary components of the crosswalk. The first letter in the code indicates the “Strand;” the following number indicates the “Big Idea;” the next letter indicates the “Concept;” and the last number identifies the “Grade Level.” For example, a crosswalk identified as N.1.A.9 would be interpreted as:

N = Mathematics – Number and Operations

1 = Understand numbers, ways of representing numbers, relationships among numbers and number systems

A = Read, write and compare numbers

9 = Grade – in this case, students should develop these skills at the ninth grade level

The full listing of Grade Level Expectations is available on the Department of Elementary and Secondary Education Web-site at:

<http://dese.mo.gov/divimprove/curriculum/GLEDocuments.html>

Food Science

Cross-Reference to Missouri Grade Level Expectations

STRAND LEGEND			
Communication Arts	Mathematics	Social Studies	Science
Information Literacy (I)	Number and Operations (N)	Economic Concepts and Principles (EC)	Matter and Energy (ME)
Listening and Speaking (L)	Algebraic Relationships (A)	Principles and Processes of Governance Systems (GS)	Force and Motion (FM)
Reading (R)	Geometric and Spatial Relationships (G)	Missouri, United States, and World History (HS)	Living Organisms (LO)
Writing (W)	Measurement (M)	Principles of Constitutional Democracy (PC)	Ecology (EC)
	Data and Probability (D)	Relationships of Individuals and Groups to Institutions and Traditions (RI)	Earth Systems (ES)
		Tools of Social Science Inquiry (TI)	Universe (UN)
		United States History (US)	Scientific Inquiry (IN)
		World History (WH)	Science, Technology, and Human Activity (ST)
		Elements of Geographical Study (EG)	

Food Science

Cross-Reference to Missouri Grade Level Expectations

Measurable Learner Objective and Task Statement	CORE AREAS			
	Communication Arts	Mathematics	Social Studies	Science
A. Orientation to Food Science				
1. Compare and contrast food science to foodservice management	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			
2. Utilize basic principles of measurement in scientific experimentation (e.g., metrics, formulas, and equations)				IN.1.A.9-11 IN.1.B.9-11a
3. Demonstrate use, care, and safety of scientific lab equipment	L.2.A.9-12			IN.1.B.9-11
4. Explain the steps in the scientific method	R.3.D.9-12			IN.1.A.9-11
5. Write accurate and complete reports of science experiments	W.1.A.9-12 W.2.B.9-12 W.2.C.9-12 W.2.D.9-12 W.2.E.9-12 W.2.F.9-12			IN.1.A.9-11 IN.1.E.9-11a
6. Identify the public and private organizations that influence food service, dietetics and nutrition industries	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			

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Measurable Learner Objectives are bold font

Food Science

Cross-Reference to Missouri Grade Level Expectations

Measurable Learner Objective and Task Statement	CORE AREAS			
	Communication Arts	Mathematics	Social Studies	Science
7. Identify career paths related to food science, dietetics and nutrition	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			
Other:				
B. Sensory Evaluation of Food				
1. Identify qualities that make up the sensory characteristics of food	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			
2. Describe characteristics of sensory evaluation using appropriate terms	W.1.A.9-12 W.2.B.9-12 W.2.C.9-12 W.2.D.9-12 W.2.E.9-12 W.2.F.9-12			
3. Determine characteristics that affect food preferences	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			

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	Communication Arts	Mathematics	Social Studies	Science
Other:				
C. Food Safety and Sanitation				
1. Compare the positive and negative effects of yeast, molds, bacteria and enzymes in foods				ME.1.G.9-11 EC.1.B.8a LO.2.D.9-11d
2. Identify principles of HACCP (assess hazards, identify critical control points, set up control procedures, monitor critical control points, take corrective actions, develop a record keeping system, verify that the system is working)	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			
3. Describe the types of microorganisms that cause foodborne illness (e.g., bacteria, viruses, parasites, yeast, molds)	W.1.A.9-12 W.2.B.9-12 W.2.C.9-12 W.2.D.9-12 W.2.E.9-12 W.2.F.9-12			IN.1.A.9-11 LO.2.G.8b LO.2.G.8c
4. Explain the relationship between microorganisms and foodborne illness				IN.1.A.9-11 LO.2.G.8b LO.2.G.8c
5. Describe the basic environmental conditions that encourage the growth of microorganisms (e.g., time, temperature, moisture, oxygen)	W.1.A.9-12 W.2.B.9-12 W.2.C.9-12 W.2.D.9-12 W.2.E.9-12 W.2.F.9-12			IN.1.A.9-11 EC.1.B.8b
6. Identify the three major types of hazards that cause foodborne illness (biological, chemical and physical)				IN.1.A.9-11 LO.1.C.9-11b

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	Communication Arts	Mathematics	Social Studies	Science
7. Describe symptoms and causative agents of major foodborne illnesses (e.g., salmonellosis, botulism, hepatitis A)	W.1.A.9-12 W.2.B.9-12 W.2.C.9-12 W.2.D.9-12 W.2.E.9-12 W.2.F.9-12			IN.1.A.9-11 EC.1.D.8a
8. Discuss how contamination and cross-contamination of foods can occur				IN.1.A.9-11
9. Identify methods and procedures for controlling foodborne illness	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			
10. Demonstrate personal hygiene/health practices essential for food safety and sanitation	R.3.D.9-12			
11. Name typical products, tools and methods for effective cleaning and sanitizing	W.1.A.9-12 W.2.B.9-12 W.2.C.9-12 W.2.D.9-12 W.2.E.9-12 W.2.F.9-12			
12. Identify location of and information on MSDS (Material Safety Data Sheets)	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			

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	Communication Arts	Mathematics	Social Studies	Science
Other:				
D. Science Foundations				
1. Demonstrate the effects of acids and bases in food metabolism, preparation, processing and preservation	R.3.D.9-12			IN.1.A.9-11 ME.2.A.8a ME.1.B.9-11b
2. Describe the classes of matter, including pure substances and mixtures	W.1.A.9-12 W.2.B.9-12 W.2.C.9-12 W.2.D.9-12 W.2.E.9-12 W.2.F.9-12			ME.1.B.9-11 ME.1.A.9-11b ME.1.A.9-11c
3. Identify the elements found in biochemical systems (food) and their atomic symbols	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			ME.1.F.9-11
4. Explain the properties and principles of matter and energy (e.g., bonding, parts of the atom)	W.1.A.9-12 W.2.B.9-12 W.2.C.9-12 W.2.D.9-12 W.2.E.9-12 W.2.F.9-12			ME.1.G.9-11 ME.1.I.9-11 ME.1.F.9-11c ME.1.E.9-11a ME.1.E.9-11b ME.1.E.9-11c ME.1.E.9-11d ME.1.E.9-11e

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	Communication Arts	Mathematics	Social Studies	Science
5. Identify components of a chemical equation	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			ME.1.I.9-11a ME.1.I.9-11b
6. Differentiate between chemical reactions and physical changes in food	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			ME.1.G.9-11 ME.1.I.9-11 ME.2.D.9-11 LO.2.D.9-11d
7. Demonstrate the relationship between energy, physical changes, and chemical reactions	R.3.D.9-12			ME.1.G.9-11 LO.2.D.9-11a ME.1.D.8c
8. Discuss the relationship between molecular motion and temperature				IN.1.A.9-11 ME.1.D.9-11a
9. Explain how heat is transferred	R.3.D.9-12			ME.2.A.9-11 ME.2.D.9-11
10. Interrelate the effects of temperature, latent heat and phase changes				ME.1.D. 9-11d
Other:				
E. Biochemistry of Foods and the Major Nutrient Groups (Carbohydrates, Proteins, Lipids, Vitamins, Minerals and Water)				

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	Communication Arts	Mathematics	Social Studies	Science
1. Describe terms related to the major nutrients and nutrient groups	R.1.C.9-12 R.1.E.9-12			LO.2.D.9-11b
2. Describe the functions of the major nutrients and nutrient groups	W.1.A.9-12 W.2.B.9-12 W.2.C.9-12 W.2.D.9-12 W.2.E.9-12 W.2.F.9-12			LO.2.D.9-11b
3. Explain the functions of the major nutrients and nutrient groups in foods and food systems	W.1.A.9-12 W.2.B.9-12 W.2.C.9-12 W.2.D.9-12 W.2.E.9-12 W.2.F.9-12			LO.2.D.9-11
4. Explain the process of sugar hydrolysis	W.1.A.9-12 W.2.B.9-12 W.2.C.9-12 W.2.D.9-12 W.2.E.9-12 W.2.F.9-12			LO.2.D.9-11 ME.2.A.8a
5. Identify the product resulting from the hydrolysis of sucrose and lactose	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			LO.2.D.9-11

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	Communication Arts	Mathematics	Social Studies	Science
6. Compare the structures of amylose and amylopectin and their effect on cooking properties	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			LO.2.D.9-11
7. Discuss gelatinization, paste, retrogradation and syneresis as they relate to starch cookery	R.1.C.9-12 R.1.E.9-12			
8. Explain what occurs during denaturation	R.3.D.9-12			
9. Describe the chemical structure of protein	W.1.A.9-12 W.2.B.9-12 W.2.C.9-12 W.2.D.9-12 W.2.E.9-12 W.2.F.9-12			LO.2.E.9-11a
10. Compare the properties of saturated and unsaturated fatty acids	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			LO.2.D.9-11b

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	Communication Arts	Mathematics	Social Studies	Science
11. Identify foods that contain saturated and unsaturated fats (triglycerides)	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			
12. Explain the differences between the types of fats and cholesterol	R.3.D.9-12			
13. List the ways lipid oxidation can be controlled in food				
14. Explain the role of water in the formation of solutions, colloidal dispersions and emulsions				LO.2.F.9-11
15. Compare and contrast bound and free water in foods	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			LO.2.F.9-11
16. Compare and contrast water soluble and fat soluble vitamins	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			

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	Communication Arts	Mathematics	Social Studies	Science
17. Distinguish between major and trace minerals	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			
18. Identify some interrelationships among nutrients (e.g., vitamin D and calcium)	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			
19. Discuss the effect of food processing on vitamin and mineral levels in food	W.1.A.9-12 W.2.B.9-12 W.2.C.9-12 W.2.D.9-12 W.2.E.9-12 W.2.F.9-12			
20. Relate metabolism to the factors that affect it	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			LO.2.F.8a
Other:				

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	Communication Arts	Mathematics	Social Studies	Science
F. Chemistry of Food Formulations and Reactions				
1. Explain the relationships between enzymes, coenzymes and substrates	W.1.A.9-12 W.2.B.9-12 W.2.C.9-12 W.2.D.9-12 W.2.E.9-12 W.2.F.9-12			
2. Identify factors that affect enzymatic activity	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			IN.1.A.9-11 LO.2.D.9-11d
3. Distinguish the function of enzymatic reactions in food spoilage and food preparation	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			IN.1.A.9-11
4. Identify the solvents and solutes in solutions	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			IN.1.A.9-11 ME.1.B.9-11c

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	Communication Arts	Mathematics	Social Studies	Science
5. Analyze the effect of concentration on physical properties of a solution				IN.1.A.9-11 IN.1.B.9-11 IN.1.C.9-11 ME.1.B.9-11a
6. Identify the properties of colloidal dispersions				
7. Explain the relationship of an emulsion's parts.	W.1.A.9-12 W.2.B.9-12 W.2.C.9-12 W.2.D.9-12 W.2.E.9-12 W.2.F.9-12			
8. Explain the functions and properties of leavening agents	W.1.A.9-12 W.2.B.9-12 W.2.C.9-12 W.2.D.9-12 W.2.E.9-12 W.2.F.9-12			
9. Identify the classes of food additives	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			
10. Discuss the role of governmental regulations regarding food additives			GS.3.C.9-12	

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11. Explain the use of additives in food	W.1.A.9-12 W.2.B.9-12 W.2.C.9-12 W.2.D.9-12 W.2.E.9-12 W.2.F.9-12			
12. Discuss the risks and benefits of using additives in food	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			ST.1.C.9-11
Other:				
G. Food Manufacturing Processes (Fermentation, Canning, Freezing, Dehydration and Irradiation)				
1. Define terms related to food manufacturing processes	R.1.C.9-12 R.1.E.9-12			
2. Identify commonly processed foods	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			

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	Communication Arts	Mathematics	Social Studies	Science
3. Compare and contrast food manufacturing processes	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			
4. Identify equipment used in food manufacturing processes	R.1.C.9-12 R.1.D.9-12 R.1.E.9-12 R.1.F.9-12 R.1.G.9-12 R.1.H.9-12 R.1.I.9-12			
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