

SCIENCE AND OUR FOOD SUPPLY

Food Safety from **Farm** to **Table** – Middle Level

Education Standards by Activity															
	The Big Picture	Bacteria Everywhere	12 Most Unwanted Bacteria	Chain of Food	Blue's the Clue	Mystery Juice	Ultra High Pressure Treatment	Supermarket Smarts	Cooking Right	A Chilling Investigation	Crossed Up!	Hands Off Bacteria!	Outbreak Alert	Beef Blasters	Lose a Million Bacteria – The Game
NGSS - Physical Science: Structure and Properties of Matter				✓				✓							✓
NGSS - Physical Science: Chemical Reactions					✓				✓						✓
NGSS - Physical Science: Energy									✓					✓	✓
NGSS - Physical Science: Waves and Electromagnetic Radiation														✓	✓
NGSS - Life Science: Structure, Function, and Information Processing	✓	✓	✓	✓									✓		✓
NGSS - Life Science: Matter and Energy in Organisms and Ecosystems				✓									✓		✓
NGSS - Life Science: Interdependent Relationships in Ecosystems				✓											✓
NGSS - Life Science: Growth, Development, and Reproduction of Organisms	✓	✓	✓	✓											✓
NGSS - Life Science: Natural Selection and Adaptations				✓											✓
NGSS - Earth and Space Sciences: Earth's Systems				✓											✓
NGSS - Earth and Space Sciences: Human Impacts				✓											✓
NGSS - Engineering Design				✓				✓							✓
NGSS - Nature of Science		✓			✓	✓			✓	✓	✓	✓			✓
NSFCSE 3.0 - Food Production & Services			✓										✓	✓	✓
NSFCSE 3.0 - Food Science, Dietetics, & Nutrition	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NSFCSE 3.0 - Nutrition & Wellness	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CCSS-ELA-Literacy	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

See next pages for full standards: NGSS, NSFCSE and Common Core ELA-Literacy. ▶

EDUCATION STANDARDS - MIDDLE LEVEL

Science and Our Food Supply: Food Safety from Farm to Table aligns with the following current education standards:

NGSS – Next Generation Science Standards Arranged by Topic

Physical Science

Structure and Properties of Matter

- MS-PS1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

Chemical Reactions

- MS-PS1-2 Analyze and interpret data on the properties of substances before and after substances interact to determine if a chemical reaction has occurred.
- MS-PS1-5 Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

Energy

- MS-PS3-4 Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.
- MS-PS3-5 Construct, use, and present arguments to support the claim that when the motion energy of an object changes, energy is transferred to or from the object.

Waves and Electromagnetic Radiation

- MS-PS4-2 Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.

Life Science

Structure, Function, and Information Processing

- MS-LS1-1 Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.
- MS-LS1-2 Develop and use a model to describe the function of the cell as a whole and ways parts of cells contribute to the function.

Matter and Energy in Organisms and Ecosystems

- MS-LS1-6 Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and the flow of energy into and out of organisms.
- MS-LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
- MS-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
- MS-LS2-4 Construct an argument, supported by empirical evidence, that changes to physical or biological components of an ecosystem affect populations.

Interdependent Relationships in Ecosystems

- MS-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

Growth, Development, and Reproduction of Organisms

- MS-LS1-4 Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.
- MS-LS1-5 Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

- MS-LS3-1 Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of an organism.
- MS-LS3-2 Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.
- MS-LS-4-5 Gather and synthesize information about technologies that have changed the way humans influence the inheritance of desired traits in organisms.

Natural Selection and Adaptations

- MS-LS-4-4 Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.

Earth and Space Sciences

Earth's Systems

- MS-ESS3-1 Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

Human Impacts

- MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
- MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

Engineering Design

- MS-ETS1-3 Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

Nature of Science

- Science investigations use a variety of methods and tools to make measurements and observations.
- Science investigations are guided by a set of values to ensure accuracy of measurements, observations, and objectivity of findings.
- Science depends on evaluating proposed explanations.
- Science knowledge is based upon logical and conceptual connections between evidence and explanations.
- Science disciplines share common rules of obtaining and evaluating empirical evidence.
- Scientific explanations are subject to revision and improvement in light of new evidence.
- The certainty and durability of science findings varies.
- Science findings are frequently revised and/or reinterpreted based on new evidence.
- Science is both a body of knowledge and the processes and practices used to add to that body of knowledge.
- Science knowledge is cumulative and many people, from many generations and nations, have contributed to science knowledge.
- Science is a way of knowing used by many people, not just scientists.
- Science carefully considers and evaluates anomalies in data and evidence.
- Men and women from different social, cultural, and ethnic backgrounds work as scientists and engineers.
- Scientists and engineers rely on human qualities such as persistence, precision, reasoning, logic, imagination and creativity.
- Scientists and engineers are guided by habits of mind such as intellectual honesty, tolerance of ambiguity, skepticism and openness to new ideas.
- Advances in technology influence the progress of science and science has influenced advances in technology.
- Scientific knowledge is constrained by human capacity, technology, and materials.

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National Standards for Family and Consumer Science Education 3.0

8.0 Food Production & Services

- 8.1.1 Explain the roles, duties, and functions of individuals engaged in food production and service careers.
- 8.2.1 Identify characteristics of major foodborne pathogens, their role in causing illness, foods involved in outbreaks, and methods of prevention.
- 8.2.3 Use knowledge of systems for documenting, investigating, reporting, and preventing food borne illness.

9.0 Food Science, Dietetics, & Nutrition

- 9.1.1 Explain the roles and functions of individuals engaged in food science, food technology, dietetics, and nutrition care.
- 9.2.1 Analyze factors that contribute to foodborne illness.
- 9.2.2 Analyze food service management safety and sanitation programs.
- 9.2.3 Implement industry standards for documenting, investigating, and reporting foodborne illness.
- 9.5.7 Conduct testing for safety of food products, utilizing available technology.
- 9.6.9 Utilize Food Code Points of time, temperature, date markings, cross contamination,

14.0 Nutrition & Wellness

- 14.4.1 Analyze conditions and practices that promote safe food handling.
- 14.4.2 Analyze safety and sanitation practices.
- 14.4.5 Analyze foodborne illness factors, including causes, foods at risk, and methods of prevention commercially and by individuals and families.
- 14.4.6 Analyze current consumer information about food safety and sanitation.
- 14.5.1 Analyze how the scientific and technical advances in food processing, storage, product development, and distribution influence nutrition and wellness.

Common Core State Standards, ELA-Literacy

- RL.8.1 Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
- RL.8.4 Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including analogies or allusions to other texts.
- RI.8.1 Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
- RI.8.4 Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including analogies or allusions to other texts.
- W.8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
- W.8.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- W.8.5 With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
- W.8.6 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas efficiently as well as to interact and collaborate with others.
- W.8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
- W.8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

- W.8.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.
- SL.8.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 8 topics, texts, and issues*, building on others' ideas and expressing their own clearly.
- SL.8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.
- SL.8.5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
- SL.8.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.
- L.8.1 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
- L.8.2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.
- L.8.3 Use knowledge of language and its conventions when writing, speaking, reading, or listening.
- L.8.6 Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.