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CTE Standards Unpacking
Food Science

Course: Food Science
Course Description: The state of South Dakota is diverse in the agriculture products it produces and the value added food products available to the consumer. Food Science is a course designed to provide students with an overview of food science and its importance to producers and consumers. Classroom and laboratory content may be enhanced by utilizing appropriate equipment and technology. Mathematics, science, English and human relations skills will be reinforced in the course. Work-based learning strategies appropriate for this course are school-based enterprises, field trips and internships. Opportunities for application of clinical and leadership skills are provided by participation in FFA through activities, conferences and skills competitions such as the Food Science Career Development Event (CDE), Meat Evaluation CDE and Milk Quality and Products CDE. Each student will be expected to maintain a Supervised Agricultural Experience (SAE).
Career Cluster: Agriculture, Food and Natural Resources
Prerequisites: Recommended: Introduction to AFNR
Program of Study Application: Food Science is a first pathway course in the Agriculture, Food and Natural Resources cluster, Food Product and Processing Systems pathway. Food Science would follow a cluster course and would prepare a student to participate in Ag Processing Technology (Food and Fiber).

<table>
<tr><td colspan="3">INDICATOR #FS 1: Examine the makeup of the food industry.</td></tr>
<tr><td colspan="3">SUB-INDICATOR 1.1 (Webb Level: 3 Strategic Thinking): Investigate advancements in food science techniques.</td></tr>
<tr><td colspan="3">SUB-INDICATOR 1.2 (Webb Level: 2 Skill/Concept): Identify organizations and their impact on the food industry.</td></tr>
<tr><td>Knowledge (Factual):
-Identify the components (production, manufacturing/processing, distribution, and marketing) of the food industry

-Discuss industry organizations and their purposes</td><td>Understand (Conceptual):
-Understand how the make-up of our food industry changes by consumer demands and concerns

-Understand the role organizations (ex. Beef Council, Pork Council) play in our changing food industry</td><td>Do (Application):
-Critique and track changes in the food industry

-Research the purpose of organizations that regulate the food industry</td></tr>
<tr><td colspan="3">Benchmarks:
Students will be assessed on their ability to:
• Create a presentation on a specific food production company and the impact it has on the food industry.</td></tr>
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- Have students interview a representative from an organization involved in the food industry and create an iMovie.
- Research and write a paper on how the food industry has changed over the years.

Academic Connections	
ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
English: 1) 9-12 W.6 – Use technology, including the internet, to produce an individual writing product.	-Research the purpose of organizations that regulate the food industry, using a variety of resources. Create a written presentation using your research.
2)9-12 SL.4 - Presenting information, findings, and evidence conveying a clear perspective.	-Create a presentation about the regulations affecting a specific food production company.

INDICATOR #FS 2: **Apply safety and sanitation procedures for food production.**		
SUB-INDICATOR 2.1 (Webb Level: 1 Recall): Describe proper safety and sanitation practices when working with food products.		
SUB-INDICATOR 2.2 (Webb Level: 2 Skill/Concept): Apply safety and sanitation practices used in the food industry.		
SUB-INDICATOR 2.3 (Webb Level: 1 Recall): Identify origins of food borne pathogens and effective prevention and control methods.		
Knowledge (Factual):	**Understand (Conceptual):**	**Do (Application):**
-Identify techniques for handling food products safely -Explain the importance of record keeping in the food industry	-Understand the importance of performing quality-assurance tests on food products -Understand the importance of microbiological tests in food production, preparation, including common spoilage and pathogenic microorganisms	-Investigate the effects food-borne pathogens have on food and humans -Set-up and make observations of common spoilage and pathogenic microorganisms -Illustrate documentation procedures in the food industry -Research and graph

		food outbreaks -Research a food borne pathogen

Benchmarks:
Students will be assessed on their ability to:

- Follow proper production protocols (e.g. Good Manufacturing Practices, Hazard Analysis Critical Control Points, Standard Operating Procedures)
- Practice effective prevention and control methods.
- Complete ServSafe Food Handler Certification Training.
- Compete in Food Science Career Development Event.
- Compete in Milk Quality and Products Career Development Event.
- Compete in Meats Evaluation and Technology Career Development Event.
- Practice safe food product handling procedures.
- Employ quality-assurance tests of food products.

Academic Connections

ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
English: 1) 9-12 SL.4 - Presenting information	-Compete in the Food Science Career Development Event. (Team Portion)
2) 9-12 W.6 – Use technology, including the internet, to produce an individual writing product.	-Research and write a report on a certain food-borne illness.

INDICATOR #FS 3: **Apply principles of science to producing safe, wholesome and nutritious food products.**		
SUB-INDICATOR 3.1 (Webb Level: 2 Skill/Concept): Apply fundamental chemistry to food science.		
SUB-INDICATOR 3.2 (Webb Level: 2 Skill/Concept): Differentiate the makeup of food products.		
SUB-INDICATOR 3.3 (Webb Level: 3 Strategic Thinking): Develop a food product that meets the standards of regulatory agencies.		
Knowledge (Factual):	**Understand (Conceptual):**	**Do (Application):**

-Identify how the chemical and physical properties of foods influence nutritional value and product quality -Discuss common food constituents (proteins, carbohydrates, fats, vitamins, minerals) -Identify common food additives (preservatives, antioxidants, buffers, stabilizer, colors, flavors) -Identify the chemical and physical properties of food products -Recognize the importance of food labeling to consumers	-Understand the development process of safe, wholesome, and nutritious food -Understand the fundamental chemistry in food science -Understand the make-up of food products -Understand food regulatory agencies	-Design a food label with the correct components -Construct a new food product -Compare and contrast the nutritional value of food and food groups -Critique the nutritional value of food and food groups -Compare and contrast food constituents and their relative value to product taste, appearance, etc. -Examine and debate the purpose of common food additives and color

Benchmarks:
Students will be assessed on their ability to:

- Analyze food products to identify food constituents.
- Formulate sensory-testing and marketing functions to characterize consumer preference and market potential.
- Complete ServSafe Food Handler Certification Training.
- Compete in Food Science Career Development Event.
- Compete in Milk Quality and Products Career Development Event.
- Compete in Meats Evaluation and Technology Career Development Event.

Academic Connections

ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):	**Sample Performance Task Aligned to the Academic Standard(s):**
English: 9-12 W.6 – Use technology, including the internet, to produce an individual writing product. Science:	-Develop a written plan based on the food item you have created and are marketing.

HS-LS1-7 – Use a model of the major inputs and outputs of cellular respiration (aerobic and anaerobic) to exemplify the chemical process in which the bonds of food molecules are broken, the bonds of new compounds are formed, and a net transfer of energy results.	-Make yogurt, cheese, sauerkraut, etc.

INDICATOR #FS 4: **Develop employability skills related to the Food Product and Processing Systems.**		
SUB-INDICATOR 4.1 (Webb Level: 2 Skill/Concept): Develop soft skills to enhance employability.		
Knowledge (Factual): -Identify food science related careers -Recognize non-verbal communication signals. -Identify ways to handle conflict	**Understand (Conceptual):** -Understand food products and processing system pathways -Understand food products and processing system career educational requirements	**Do (Application):** -Demonstrate proper communication skills -Compose a cover letter, resume, and follow-up letter -Fill out a job application -Complete a job interview
Benchmarks: *Students will be assessed on their ability to:* • Create an SAE project. • Work as a team to solve problems.		
Academic Connections		
ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard): English: 1) 9-12 SL.1 - Participate in collaborative discussion 2) 9-12 W.2 – Write to inform	**Sample Performance Task Aligned to the Academic Standard(s):** -Complete a job interview with local business representatives. -Compose a cover letter, resume, and follow-up letter.	

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Additional Resources

- ServSafe Food Handler Certification Training
- Chemical Cuisine: Natural and Synthetic Chemicals in Foods by Center for Chemistry Education, Miami University Middletown, Middletown, Ohio (Carolina)
- Ag Explorer: agexplorer.com
- Delmar Introduction to Food Science textbook
- Various lessons through MyCAERT
- Communities of Practice-Food Science: https://communities.naae.org/community/instruction/agriscience/foodscience
- Dairy Foods Curriculum by Sheri L. Kahnke and Dr. Robert Baer
- Food Safety and Nutrition Education Curriculum: http://www.teachfoodscience.org/curriculum.asp
- Food Science for Kids of All Ages!: Resources for Teachers: http://foodscience.psu.edu/youth/educators
- Curriculum of Agricultural Science Education Food Science and Safety
- Institute Food Technologists: http://www.ift.org/knowledge-center/learn-about-food-science/k12-outreach.aspx
- Food Safety Scientist: http://igrow.org/healthy-families/food-safety/food-safety-scientist/