Food Science & Technology

Nebraska Career Development Event

Handbook and Rules for 2022-2026

1. Event Purpose

a. The Food Science and Technology career development event is designed to promote learning activities in food science and technology related to the food industry and to assist students in developing practical knowledge of principles used in a team decision-making process.

b. **Allergy Information:** Food products used in this event may contain or come in contact with potential allergens. Advisors must submit a special needs request to the event superintendent(s) for participants with any allergies. The event committee will make all reasonable efforts to accommodate students with food allergies.

2. CDE Objectives

a. Team Product Development
    i. Select appropriate ingredients to use in a product formulation that meets the requirements of the product scenario.
    ii. Calculate the correct weights, percentages, and nutritional values of selected ingredients for the Nutrition Facts Panel.
    iii. Design packaging for their product with a Principal Display Panel, Information Panel, allergen labeling and health claims that meets the U.S. FDA standards and fulfills the contest's marketing scenario requirement.
    iv. Identify key processes for production, packaging, and quality control, and predict food safety concerns that may be associated with their product.
b. Individual Food Safety Practicum
    i. Visually determine if a food safety scene contains a violation or is in compliance and then if a violation is present, determine whether that violation is a safety or quality issue.
    ii. Recognize food safety concerns versus food quality issues from reading customer complaint letters, and then distinguish the food safety concerns as chemical, biological, or physical issues.
c. Individual Aroma Test
    i. Identify 10 aromas, by smell, from the list provided in the appendix.
d. Individual Triangle Test
    i. Identify which of the samples is unlike the other two, using sensory evaluation skills including aroma, flavor, visual cues, and/or textural differences.
e. Individual General Knowledge Exam
    i. Demonstrate a broad understanding of the basic principles of the food science and technology field. Topics for the exam may include:
        1. Food Safety
        2. Nutrition
        3. Food Chemistry
        4. Food Physics
        5. Microbiology
        6. Food Processing

3. Eligibility

a. This event is open to students in grades 9-12.
b. The top three schools from each district will qualify for the state event.

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4. Recommended Attire

a. Official FFA Dress or other professional dress is strongly recommended for this event.

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5. Required Supplies & Equipment

a. Each participant must provide:
    i. Two sharpened No. 2 pencils
    ii. Non-programmable calculator
    iii. Colored pencils recommended
b. Items NOT allowed during the event:
    i. Electronic media including but not limited to cell phones and cameras.
    ii. Notepads, notebooks, blank paper.

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6. Event Schedule

a. Teams will be assigned to one of four groups (groups are labeled A-D).
b. Half the teams will start on the Team Product Development (1 hour)
c. Half the teams will do the Individual Practicums (50 minutes)
    i. Sensory (Aromas & Triangle Tests) (25 minutes)
    ii. Food Safety (Safety Pictures & Customer Inquiry) (25 minutes)
d. All Teams will complete the Individual General Knowledge Exam at the end (30 minutes)
e. Expected Rotation (Provided as an example, times may change, check CDE schedule for official times)

Groups	7:00 AM	7:30 AM	8:00 AM	8:30 AM	9:00 AM
A (1-9)	Product Development		Safety	Sensory	General Exam
B (10-18)	Product Development		Sensory	Safety	General Exam
C (19-27)	Safety	Sensory	Product Development		General Exam
D (28-36)	Sensory	Safety	Product Development		General Exam

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7. Annual Theme

a. There is no annual theme for this event.

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8. Event Format

a. Half the teams will start on the Team Product Development (see appendix.)
    i. Examples of scenario product from past events:
        1. Ready to eat breakfast cereal for retail
        2. Refrigerated frozen cookie dough for wholesale
        3. Yogurt parfait for convenience store
        4. Refrigerated, heat and serve pizza for retail
        5. Shelf stable, dried fruit snack mix for retail
        6. Frozen, all-natural, gluten-free peanut butter cookie dough for retail.
b. Half the teams will do the Individual Practicums.
    i. Sensory Evaluation Practicum
        1. 10 Aromas
        2. 2 Triangle Tests
    ii. Food Safety Practicum (10 Total)
        1. 5-7 Safety Pictures
        2. 3-5 Customer Inquiry Letters
c. All Teams will complete the Individual General Knowledge Exam at the end (50 Multiple Choice questions).

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9. Scoring

Individual Scoring

Event	Individual Points
General Knowledge Exam	150
Sensory Evaluation Practicum	50
Food Safety Practicum	50
Total Individual score	**250**

Team Scoring

Event		Team Points
Product Development Project		400
Total of 4 Individual Scores	(4 x 250)	1000
Total Team Score		**1400**

10. Tiebreaker

a. Individual
   i. Highest objective multiple test score.
   ii. Highest food safety practicum score.
b. Team
   i. Highest team product development project score
   ii. Highest number of total points earned from the objective multiple choice test (adding all four team member scores)
   iii. Total points earned by the team in the food safety practicum.

11. Resource Materials

a. General
   i. Food Science CDE Training June 2017 (PowerPoint download)
      1. https://go.unl.edu/foodscippt
b. Team Product Development
   i. Food Science 2017 Product Development Webinar
      1. https://go.unl.edu/foodscicdepdw
   ii. New Food Labeling Regulations- https://go.unl.edu/guidanceregulation
c. Individual Food Safety Practicum
   i. https://go.unl.edu/foodsafetysanitation
d. Individual Aroma Test

   Aroma Samples AgEd Toolbox Julie Milligan
   P.O. Box 29
   Perry, OK 73077
   580-336-1191
   http://agedtoolbox.com/
   julie@agedtoolbox.com

e. Individual Triangle Test
    i. https://go.unl.edu/ncfoodsciguide
f. Individual General Knowledge Exam
    i. Reference Textbook: Principles of Food Science. 4th edition. 2015. Janet Ward and Larry Ward. The Goodheart-Willcox Company, INC.
    ii. Exam questions will be taken from the Examview program test bank for the Principles of Food Science. 4th edition textbook.
    iii. https://go.unl.edu/fdalearningportal – Videos and simple training modules on various aspects of food and nutrition. Food Labeling, Food Safety, Pest Control and Pasteurization good ones to start with. Also more under Resources heading (Ingredients, Packaging, and Labeling).
g. NE CDE Food Science Additional Resources

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12. Past Exams

a. Past exams will not be provided.
    i. Exam questions are taken directly from the Examview test bank for the Principles of Food Science, 4th ed. textbook.
b. Utilize the resource materials and appendices to prepare for the event.

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13. Post-CDE debriefing opportunity and criteria

a. Teachers and students are allowed to walk through after the event if they have notified the event superintendent, by email, before the state event.

APPENDIX

The following resources can be found in the appendix:

Please also check the CDE website for additional sample and study resources that may be found in a shared folder. Please contact the CDE office if you have additional files that you would like to contribute to the folder.

SAMPLE TEMPLATE – SOME ANSWERS WILL CHANGE EACH YEAR ACCORDING TO THE

Food Product Development Grading Rubric

TEAM: _____ SCORE:_____

Scoring Totals (400 pts)

_____ All required elements correctly placed on the PDP and IP (50 pts)

_____ Appealing PDP (50 pts)

_____ Correct Nutrition Facts Panel and Worksheet (125 pts)

_____ Correct Ingredient Statement (100 pts)

_____ Questions (75 pts.)

1) Draw a new package design that will best convey the product 50 pts
10 pts each

_____ **Statement of Identity –** Write your actual Statement of Identity on your package in its proper place.
_____ **Net Weight Statement** – Write your actual Net Wt Statement on your package in its proper place.
_____ **Nutrition Facts Panel** – Draw a box in the area the nutrition facts panel would appear on the package and label it as "Nutrition Facts Panel".
_____ **Ingredient Statement** – Draw a box in the area the ingredient statement would appear on the package and label it as "Ingredients".
_____ **Manufacturer Information** – Write your actual Manufacturer Information on your package in its proper place.

2) Complete Formula and the Nutrition Facts Panel - 125 points.
10 pts for Formula that adds up to 100% + 10 pts for Formula that equals *XX* grams (as defined by Product Scenario).

All calculations worth 5 pts each (105 pts total) - base %DV on actual g/mg they used whether correct or not. (21 elements) (-2 pts for Rounding errors, -2 pts for transfer error)

Servings Per Container: 1
Serving Size: 1 package (5 points) *Serving Size weight:* **(xx g)** (5 points)

Nutrient	g/mg/kCal	%DV	DV
Calories	kCal		
Fat	g		65 g
Saturated Fat	g		20 g

Trans Fat	g		
Cholesterol	mg		300 mg
Sodium	mg		2400 mg
Carbohydrate	g		300 g
Fiber	g		25 g
Sugar	g		
Added Sugars	g		50 g
Protein	g		

3) Ingredient Statement - 100 points.

- **Correct Order 40 points**
- **Parentheses Ingredients Included 40 points**
- **Ingredients include 3-4 different types of ingredients 20 points**

4) Answer the following questions:

1) What type of nutrient claims or marketing points can you make about this product? 20 pts (10 pts for claims, 10 pts for proper use)

Possible Nutrient Content claims

- "Good Source" = 10-19% of %DV,
- "High" = 20% or more of %DV
- Low Sodium (< 140mg), Low Fat (< 3 g Fat)

- HEALTHY= low in fat, saturated fat, cholesterol, and sodium AND contains 10% RDI of Protein, Fiber, Ca, Fe, Vit A, Vit C.
  - Cannot make Calcium or Iron statement without Nutrition Facts info
- Marketing points: Gluten-Free, Convenient, …

2) a) If present in a food, what 8 allergens must be clearly listed as an ingredient or in the "Contains" statement? b) Which allergens would be included for the product you have developed? 35 pts

Wheat, Dairy, Peanuts, Tree Nuts, Shellfish, Soy, Fish, Eggs **25 pts (3 pts each + 1 for getting more than 4 correct)**

Correct allergen statement **10 points**

Example for one scenario: Possible allergens: Milk, Wheat, Almonds, Walnuts.

3) What would be a reasonable shelf-life for your product? Name three factors that affect this shelf-life. 20 pts

Example for one scenario:
Shelf life: 1-4 months
Factors: Storage (refrigerated)
Packaging (Nitrogen flush / remove oxygen)
Types of products (perishable vs. shelf-stable)
Perishable – meat, cheese vs. Shelf-stable – nuts, dried fruits

SAMPLE TEMPLATE – SOME ANSWERS WILL CHANGE EACH YEAR

Product Development Portion Nutritional Information (per 100g)
Worksheet

Item Name	Quantity (grams)	Calories (kcal)	Fat (g)	Sat Fat (g)	Trans Fat (g)	Cholesterol (mg)	Sodium (mg)	Carbs (g)	Fiber (g)	Sugar (g)	Protein (g)
Unsalted Butter											
Peanut Butter B											
Brown Sugar											
Eggs											
Rice Flour, Brown											
Salt											
Baking Soda											
Tapioca Flour											
Totals											
%DV											

% DV based on a 2,000 calorie diet.

Nutrient	DV
Total Fat	65 g
Saturated Fat	20 g
Sodium	2400
Total Carbohydrate	300 g
Dietary Fiber	25 g
Cholesterol	300 mg

2016 Worksheet

Item Name	Quantity (grams)	Calories (kcal)	Fat (g)	Sat Fat (g)	Trans Fat (g)	Cholesterol (mg)	Sodium (mg)	Carbs (g)	Fiber (g)	Sugar (g)	Protein (g)
Unsalted Butter	5	35.70	3.95	2.50	0.00	10.70	0.00	0.00	0.00	0.00	0.00
Peanut Butter B	10	55.40	5.10	1.10	0.00	0.00	47.40	2.00	0.70	0.90	2.30
Brown Sugar	15	57.00	0.00	0.00	0.00	0.00	4.20	14.70	0.00	14.55	0.00
Eggs	5	7.15	0.50	0.15	0.00	18.60	7.10	0.05	0.00	0.00	0.65
Rice Flour, Brown	10	36.30	0.30	0.10	0.00	0.00	0.80	7.60	0.50	0.10	0.70
Salt	0.5	0.00	0.00	0.00	0.00	0.00	193.79	0.00	0.00	0.00	0.00
Baking Soda	0.5	0.00	0.00	0.00	0.00	0.00	136.80	0.00	0.00	0.00	0.00
Tapioca Flour	4	13.32	0.00	0.00	0.00	0.00	0.02	0.35	0.00	0.00	0.00
Totals	**50**	**204.87**	**9.85**	**3.85**	**0.00**	**29.30**	**390.11**	**24.70**	**1.20**	**15.55**	**3.65**
%DV			15%	19%		10%	16%	8%	5%		

% DV based on a 2,000 calorie diet.

Nutrient	DV
Total Fat	65 g
Saturated Fat	20 g
Sodium	2400
Total Carbohydrate	300 g
Dietary Fiber	25 g
Cholesterol	300 mg

Appendix 3: Aroma Identification

10. Apple
11. Banana
12. Basil
13. Butter
14. Cherry
15. Chocolate
16. Cinnamon
17. Clove
18. Coconut
19. Coffee
20. Garlic
21. Ginger
22. Grape
23. Lemon
24. Licorice(anise)
25. Lime
26. Maple
27. Molasses
28. Nutmeg
29. Onion
30. Orange
31. Oregano
32. Peach
33. Peppermint
34. Raspberry
35. Sage
36. Smoke (liquid)
37. Strawberry
38. Vanilla
39. Watermelon
40. Wintergreen

Appendix 4: Lists of Food Processing Sanitation & Safety Problems

Food Safety Photos: Imagine you are an Official Food Safety Inspector. Use the given List of Potential Food Processing Sanitation and Safety Problems to determine if problems are depicted in each of the **7** photos provided. Write the number from the given list for any problem you find for each photo. **If you do NOT find any problems in the photo mark it as 50.**
Study the photos carefully. Each photo will be shown for at least 90 seconds on screen at the front of the room. Everyone will see the same picture at the same time. No talking amongst team members is allowed. Each photo will count for 5 points.

General

01. Facilities, ingredients, and packaging supplies, and processed foods shall be free of: Insects (such as flies, cockroaches, worms, etc.), insect parts (in excess of allowable limits), and insect eggs, rodents (such as rats and mice), birds and the fecal droppings or urinary discharges from any of the above.
02. No non-service animals (dogs and cats) are to be in the food processing areas.
03. Only government approved and properly labeled chemicals may be used for cleaning the processing equipment and plant work areas
04. Only government approved chemicals may be used for maintaining the food plant and storage areas from contamination by insects, rodents, birds, etc, and shall be applied by a certified pest control operator

Facilities: Food

05. Food contact surfaces shall be free from dirt and food debris.
06. Food contact surfaces shall be free from breaks, cracks, open seams, chips, inclusions, pits, and similar imperfections.
07. All production equipment must be free of dust, dirt, rust, chipping paint, or other possible contaminants.
08. Food shall be stored at least 6 inches off the ground and stored in a way that prevents contamination from miscellaneous sources.
09. All processing equipment and utensils shall be so designed and of such material and workmanship as to be effectively cleanable, and shall be properly maintained.
10. Single service food items shall be stored 6 inches off the ground and in a manner to prevent contamination.
11. Processing areas shall be free from clutter, maintenance equipment and personal items
12. Proper temperature control of processes throughout the facility, keeping hot foods hot.
13. All parts of a disassembled processing equipment line shall be cleaned immediately after usage and stored on clean racks (off floor) when not in use (Any contact with floor shall be considered re-contamination)
14. All food contact surfaces shall be constructed of heavy stainless steel, or of food grade quality sanitary plastic or rubber
15. All processing cooking vessels shall be covered whenever possible, to prevent contamination and control temperatures

Facilities: Non-Food

16. Non-food (shelving, racks and any item in the production area that does not directly touch food) contact surfaces shall be free from dirt and food debris and maintained in good repair.
17. Toxic items and chemicals shall be stored away from food items.
18. All physical facilities (floors, walls, and ceilings) shall be maintained in good repair.
19. Trucks used for transport of food shall be maintained in good repair.
20. Dumpster lids should remain closed.
21. Hole in walls or window screens are not permitted (as they may allow entry of insects or rodents)

22. Cracks or spacing under doors or windows are not permitted
23. Open outside doors or windows without screens or air curtains are not permitted
24. Rodent control programs are required (including traps or baits)
25. Open-top trash containers (inside or outside) are required to be covered
26. All overhead lights shall be shielded to avoid glass breakage and contamination of foods
27. All processing room walls shall be constructed of washable, waterproof materials
28. All hand-wash sinks in food operation and toilet areas shall be clean and sanitary, with cold & hot water and proper temperature controls and mixing valves and accessible at all times
29. Hand wash sinks and equipment wash sinks shall not be used to store soiled or clean equipment, supplies, or packaging containers.
30. Adequate covered trash containers must be available in food operation, toilet and hand-wash sink areas
31. All packaging materials, equipment, or storage and delivery supplies must be free of dust, dirt, rust, or other possible contaminants

Food Product

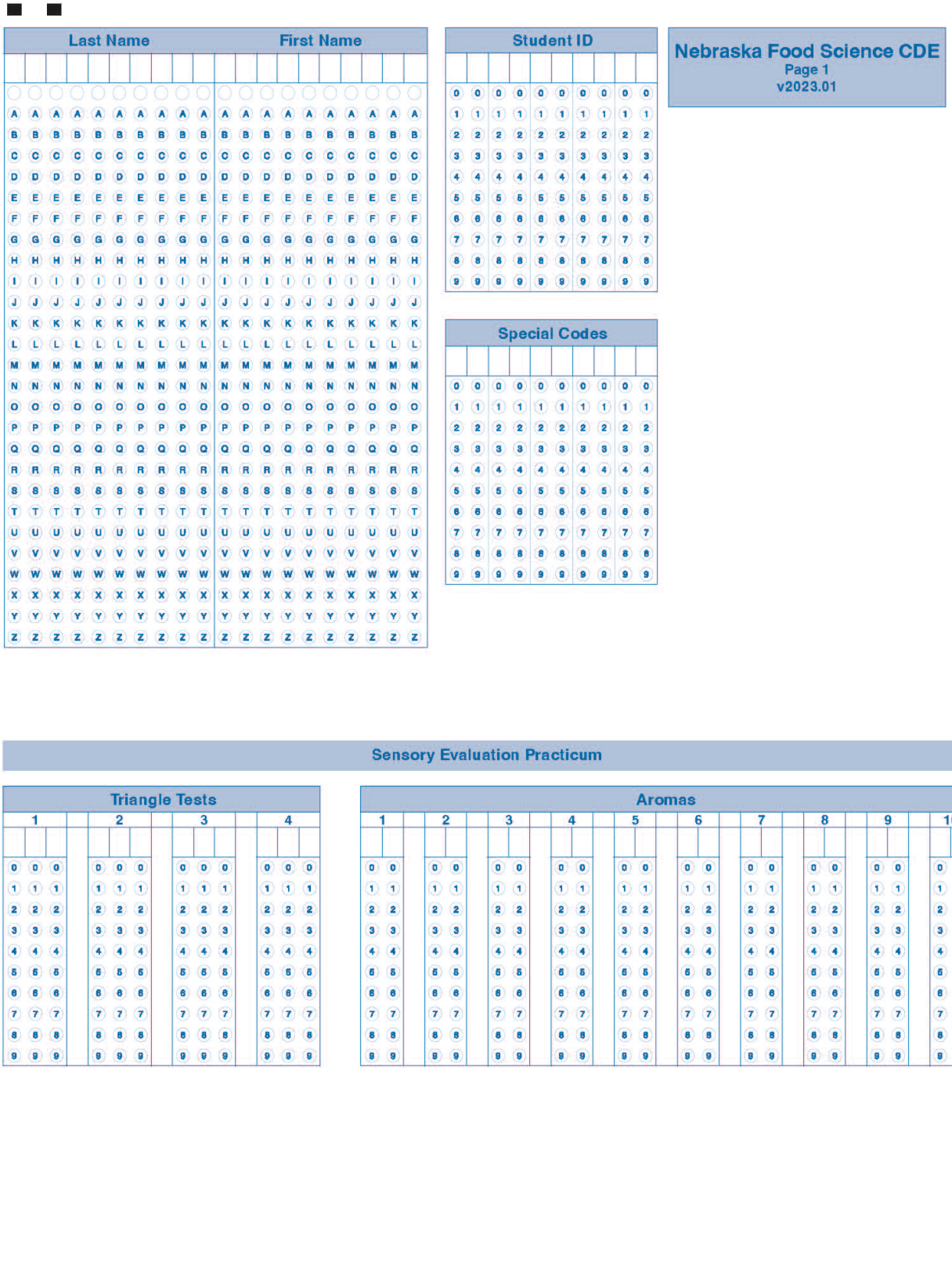
32. Canned food items shall be of good condition with no damage along the seams of the can.
33. All packaged food products must be labeled properly, including the common and usual name of the food, the weight or volume, an ingredient list and the name and address of manufacturer and distributor.
34. Refrigerated potentially hazardous foods shall be transported and received at 41 degrees Fahrenheit or below.
35. Processed foods shall not contain any foreign materials (such as glass, metal, wood, insects or parts of insects, or toxic substances).
36. Raw meats shall not be stored in a way that would cause cross-contamination with ready-to eat food items.
37. Potentially hazardous foods shall be maintained at a cold holding temperature of 41 degrees F.
38. Adulterated food items shall be discarded.
39. All raw ingredients shall be sound and wholesome
40. All food ingredients to be added to foods and/or processed for human consumption must be clean and free from any contact with contaminated surfaces prior to usage.

Employees

41. Food handling employees must wear hairnets and/or beard nets
42. Food employees must not touch ready-to-eat foods with their bare hands
43. Food handling employees must wash their hands prior to starting work, after picking up anything from the floor, after every visit to the toilet or at any other time whereby their hands may have become contaminated
44. Food handling employees shall wear clean, impact-resistant, sanitary gloves made of impermeable plastic or rubber whenever in direct contact with foods, ingredients or containers for these foods and supplies
45. Workers with open cuts, bruises, or wounds shall not handle foods or raw ingredients and workers shall be free of any disease that can be communicable through food or equipment

50. *No problem is evident in this photo*

Appendix 5: Sample Scantron



Individual General Knowledge Exam

General Knowledge

1 A B C D E	11 A B C D E	21 A B C D E	31 A B C D E	41 A B C D E
2 A B C D E	12 A B C D E	22 A B C D E	32 A B C D E	42 A B C D E
3 A B C D E	13 A B C D E	23 A B C D E	33 A B C D E	43 A B C D E
4 A B C D E	14 A B C D E	24 A B C D E	34 A B C D E	44 A B C D E
5 A B C D E	15 A B C D E	25 A B C D E	35 A B C D E	45 A B C D E
6 A B C D E	16 A B C D E	26 A B C D E	36 A B C D E	46 A B C D E
7 A B C D E	17 A B C D E	27 A B C D E	37 A B C D E	47 A B C D E
8 A B C D E	18 A B C D E	28 A B C D E	38 A B C D E	48 A B C D E
9 A B C D E	19 A B C D E	29 A B C D E	39 A B C D E	49 A B C D E
10 A B C D E	20 A B C D E	30 A B C D E	40 A B C D E	50 A B C D E

Food Safety and Quality Practicum

Customer Inquiry

	1	2	3	4	5
Food Quality	Q	Q	Q	Q	Q
Food Safety–Biological Hazard	B	B	B	B	B
Food Safety–Chemical Hazard	C	C	C	C	C
Food Safety–Physical Hazard	P	P	P	P	P

Food Safety/Sanitation Photos

1	2	3	4	5	6	7	8	9	10
0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
2 2	2 2	2 2	2 2	2 2	2 2	2 2	2 2	2 2	2 2
3 3	3 3	3 3	3 3	3 3	3 3	3 3	3 3	3 3	3 3
4 4	4 4	4 4	4 4	4 4	4 4	4 4	4 4	4 4	4 4
5 5	5 5	5 5	5 5	5 5	5 5	5 5	5 5	5 5	5 5
6 6	6 6	6 6	6 6	6 6	6 6	6 6	6 6	6 6	6 6
7 7	7 7	7 7	7 7	7 7	7 7	7 7	7 7	7 7	7 7
8 8	8 8	8 8	8 8	8 8	8 8	8 8	8 8	8 8	8 8
9 9	9 9	9 9	9 9	9 9	9 9	9 9	9 9	9 9	9 9