Food Science and Technology

Adopted 6/2019

Purpose and Standards

The purpose of the contest is 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.

Objectives

* To encourage FFA members to gain an awareness of career and professional opportunities in the field of food science and technology.
* To provide FFA members with the opportunity to experience group participation and leadership responsibilities in a competitive food science and technology program.
* To help FFA members develop technical competence and personal initiative in a food science and technology occupation.

Contestants

Teams consist of four members, with all four individual scores counting as the team score. All team members are eligible for individual awards.

Classes

|  |  |  |  |
| --- | --- | --- | --- |
| **Class** | **Time Allowed** | **Individual Points** | **Team Points** |
| Individual Activities – Objective Test | 60 minutes | 150 | 600 |
| Problem Solving/Math Practicum |  | 25 | 100 |
| Food Safety and Quality Practicum   * Customer Inquiry * Product Specification Compliance |  | 25  25 | 100  100 |
| Sensory Evaluation   * Triangle Tests * Aromas |  | 20  20 | 80  80 |
| **Total Individual Points** |  | **265** | **1060** |
|  |  |  |  |
| Team Product Development Project   * Package Design * Product Development * Response to Judges’ Questions | 80 minutes |  | 100  250  50 |
| Food Safety/Sanitation Team Activity   * Team Food & Safety/Sanitation * Team Activity Preparation |  |  | 80  20 |
| **Total Team Points** |  |  | **500** |
|  |  |  |  |
| **Total Overall Points Possible** |  | **265** | **1560** |

Tiebreaker

1. Team ties will be broken by the highest Team Product Development Project score. If the tie persists, then the highest team Food Safety/Sanitation score will break the tie. If a third tiebreaker is needed, the total combined individual points (adding all four team members scores) will break the tie.
2. Individual ties will be broken by individual’s scores on the Objective Test. If the tie persists, then the highest Food Safety and Quality Practicum score is the second tiebreaker. If a third tiebreaker is needed, the highest Sensory Evaluation score will break the tie.

Sub-contest Awards

Sub-contest ribbons will be awarded to the top five individuals and teams in Food Safety and Quality, Problem Solving/Math Practicum, Sensory Evaluation, and the Objective Test and to the top five teams in Team Product Development and Team Food Safety/Sanitation.

Rules

1. The food science and technology contest will consist of four activities: a team product development project, an objective test, a food safety and quality practicum, and a sensory evaluation practicum.
2. All team members will participate in all of the activities. There will be a possible 1,000 total points per team. The team product development project will be worth 400 points per team, the objective test will be worth 50 points per individual and each of the two practicums will be worth 50 points per individual.
3. Teams and/or individuals will not be permitted to use electronic media during the event. This includes but is not limited to cell phones, mp3 players, cameras, etc.
4. Allergy Information: Food products used in this event may contain or come in contact with potential allergens. Advisors must submit a special needs request form for participants with any allergies with certification. The event committee will make all reasonable efforts to accommodate students with food allergies.
5. Each participant must provide:
   1. A clipboard that is clean and free of notes.
   2. Two sharpened No. 2 pencils.
   3. Electronic calculator – Calculators used in this event should be non-programmable and non-graphing. Calculators should have only basic functions such as addition, subtractions, multiplication, division, equals, percent, square root, +/- keys. No other calculators are allowed to be used during the event including cell phones.
6. Team Activities
   1. Product Development Project (400 points possible per team)
      1. Each team will receive a product development scenario describing the need for a new or redesigned product that appeals to a potential market segment. The team’s task will be to design a new food product or reformulate an existing product based on information contained within the product development scenario.
      2. Each team will be provided with packaging materials, ingredients, and necessary ingredient information in order to develop, label, and package a product.
      3. The team will have 60 minutes to respond to the product development scenario and reformulate or develop a product, calculate a nutritional label, develop the ingredient statement and information panel, and develop the front or principle display panel to reflect the new product.
      4. The team will be responsible for understanding and using the following concepts to develop a presentation:
         1. Cost of goods sold
         2. Nutrition
         3. Target audience
         4. Quality control
         5. Marketing and sales
         6. Product
         7. Processing
         8. Packaging
         9. Food safety
         10. Formulation concepts
         11. Quality of presentation
      5. After this time period, each team member will contribute to a ten minute oral presentation delivered to a panel of judges. No electronic media will be used in the presentation.
      6. Following the presentation there will be a ten minute question and answer period with the judges in which each team member is expected to contribute. All materials will be collected after the presentation.
      7. Total time involved for each team will be 80 minutes. Total number of points possible for this activity will be 400 points.
      8. Product development scenarios will describe a category, platform, and market. These may include but are not limited to the following categories, platforms, and markets listed below.
         1. Categories
            1. Cereal
            2. Snacks
            3. Meals
            4. Side dishes
            5. Beverages
            6. Supplements
            7. Condiments
            8. Desserts
         2. Platform
            1. Frozen
            2. Refrigerated
            3. Shelf-stable
            4. Convenience
            5. Ready to eat
            6. Heat and serve
         3. Market (domestic and international)
            1. Retail
            2. Wholesale
            3. Food service
            4. Convenience store
      9. Examples of scenario product:

|  |  |  |  |
| --- | --- | --- | --- |
| **Category** | **Platform** | **Market** | **Actual Product** |
| Side dish | Ready to prepare | Retail or big box | Whole grain, low sodium side dish |
| Beverage | Shelf-stable | Retail | Shelf-stable specialty coffee |
| Side dish | Refrigerated | Retail | Side salad for baby boomers |
| Snack | Shelf-stable | Retail | Non-nut snack bar |
| Breakfast | Ready to eat | Retail | Single serve cereal for kids |

* + 1. Evaluation criteria and points for team activity can be found on the team product development project scorecard.
  1. Food Safety/Sanitation Team Activity (100 points possible per team)
     1. Each team will be given a situation (e.g. photos, videos, written scenarios, live demonstrations, or a combination). The team will work together to evaluate the situation and complete a safety/sanitation report evaluation which will include observations, degree of conference recommendations/corrective actions.
     2. Students will be evaluated on teamwork as well as their safety/sanitation report.

1. Individual Activities
   1. Objective Test (150 points possible per individual)
      1. The objective questions administered during the food science and technology examination will be designed to determine each team member’s understanding of the basic principles of food science and technology. The test will be primarily based on the list of references at the end of this section.
      2. Team members will work individually to answer each of the 50 questions. Each person will have 60 minutes to complete the examination. Each question will be worth 3 points, for a total of 150 points.
   2. Practicums – Each team member will complete all parts of the practicums.
      1. Problem Solving/Math Practicum (25 points possible per individual)
         1. Participants will answer a series of five mathematical calculations based on common food science themes. Questions may include nutrition calculations, ingredient quantity, cost benefit analysis, estimation of cost/margin of goods sold, conversions, processing conditions, etc.
         2. Example Question: The perfect glass of sweet tea is 20 percent sugar. Lynn is making a one-gallon container of sweet tea. How many cups of sugar should she add?
            1. 2.4 cups
            2. 3.2 cups (correct answer)
            3. 3.4 cups
            4. 4 cups
      2. Food Safety and Quality Practicum – (50 points possible per individual)
         1. Customer Inquiry – Each participant will be given five scenarios representing general consumer inquiries. Participants must determine if the consumer inquiry reflects a quality or safety issue (two points per scenario) and determine if it is a biological, chemical or physical concern or a hazard (three points per scenario). This is for a total of 25 points.
         2. Product Specification Compliance – Each participant will be given sample sets (actual products and/or data sets) and will be responsible for determining compliance with the provided specification requirements. This may include, but is not limited to, determining if the product(s) is within the net weight standards, product sizing requirements, pH, color analysis, viscosity measurement, fill level tolerances, packaging specification compliance, etc. Participants will be asked five questions regarding potential compliance violations presented within the sample set. This is for a total of 25 points.
      3. Sensory Evaluation Practicum – (40 points possible per individual)
         1. Triangle Tests – Four different triangle tests will be conducted. Participants are expected to identify the different samples through flavor, aroma, visual cues and/or textural differences. Answers will be given on the sheet provided. No list will be provided for this segment of the practicum. Each test is worth 5 points. (20 points)
         2. Aromas – Each participant will be asked to identify four different aromas from vials provided at each station and record the answer on the sheet provided. A list of potential aromas will be provided to each person. Each sample is worth 5 points. (20 points)

|  |  |
| --- | --- |
| Aromas | |
| Apple  Banana  Basil  Butter  Cherry  Chocolate  Cinnamon  Clove  Coconut  Coffee  Garlic  Ginger  Grape  Lemon  Licorice (anise)  Lime | Maple  Molasses  Nutmeg  Onion  Orange  Oregano  Peach  Peppermint  Raspberry  Sage  Smoke (liquid)  Strawberry  Vanilla  Watermelon  Wintergreen |

References – this list of references is not intended to be all-inclusive. Other sources may be utilized, and teachers are encouraged to make use of the very best instructional materials available. The following list contains references that may prove helpful during event preparation.

National FFA Core Catalog – CDE questions and Answers, www.ffa.org

Principles of Food Science, 4th Edition, 2015. Janet Ward and Larry Ward, The Goodheart-Willcox Company, Inc.

*Mehas and Rodgers,* 5th Edition, 2006. Kay Yockey Mehas and Sharon Lesley Rodgers, Glencoe/McGraw, New York.

*Food Science and Safety*, 2nd Edition, 2004, George J. Seperich, Pearson Publishers

*Principles of Food Sanitation*, 5th Edition, 2006, Norman G. Marriott and Robert B. Gravani, Springer Science + Business Media, Inc.

Institute of Food Technology website, http://www.ift.org

USDA Food Safety and Inspection Service website, http://www.fsis.usda.gov

US Food and Drug Administration, www.FDA.org

ServSafe (FDA Approved Food Handling) website, www.servsafe.com

Penn State Kitchen Chemistry: Experiments, resources and materials for educators and students, http://foodscience.psu.edu/public/kitchen-chemistry

Food Safety Education, http://www.fsis.usda.gov/food\_safety\_education/for\_kids\_&teens/index.asp

Partnership for Food Safety Education, http://www.fightbac.org

FoodSafety.gov, http://foodsafety.gov

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**Team Product Development Project Scorecard**

**Team Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |
| --- | --- | --- |
| **Package Design** | **Possible Score** | **Team Score** |
| Use and development of nutrition label |  |  |
| * Required information present | 10 |  |
| * Correct calculations | 10 |  |
| * Correct organization | 10 |  |
| Use and development of the ingredient statement |  |  |
| * Present | 10 |  |
| * Correct order and all ingredients included | 10 |  |
| * Location on package | 10 |  |
| Use of principle display panel to convey information |  |  |
| * All required components | 15 |  |
| * Correct information | 15 |  |
| * Location on package | 10 |  |
| **Package Design Subtotal** | **100** |  |
| **Product Development Oral Presentation** | **Possible Score** | **Team Score** |
| Cost of Goods Sold   * Costing * Accuracy | 20 |  |
| Nutrition   * Communicate nutritional quality of product * Apply nutritional quality to health benefits | 20 |  |
| Target Audience   * Identification of key consumer | 20 |  |
| Quality Control   * Key quality attribute of consistent product * Examples: Flavor, color, texture, net weight, size, etc. | 20 |  |
| Marketing & Sales   * Communicated with future users * Promotions * Market location | 20 |  |
| Product   * Appearance * Texture * Shelf-life * Interaction of ingredients * Creativity | 20 |  |
| **Product Development Oral Presentation** | **Possible Score** | **Team Score** |
| Processing   * Description of how to make product * Equipment * Flow diagram, unit operations * People | 20 |  |
| Packaging   * Materials used * Appropriate for use of product * Creativity | 20 |  |
| Food Safety   * Discussed potential hazards/concerns associated with products | 20 |  |
| **Formulation Concepts** |  |  |
| * How well did product match concept/product development scenario | 30 |  |
| * Category | 5 |  |
| * Platform | 5 |  |
| **Quality of Presentation** |  |  |
| * Equitable participation of team members | 5 |  |
| * Organization | 5 |  |
| * Use of time allowed | 5 |  |
| * Professionalism | 5 |  |
| * Presence & Enthusiasm | 5 |  |
| * Mannerisms | 5 |  |
| **Product Development Oral Presentation Subtotal** | **250** |  |
| **Response to Judges’ Questions** | **Possible Score** | **Team Score** |
| Team Participation in Question Response   * All team members contributed | 25 |  |
| Quality of Response   * Accuracy * Ability to answer * Originality * Knowledge | 25 |  |
| **Response to Judges’ Questions Subtotal** | **50** |  |
| **TOTAL POINTS** | **400** |  |

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Team Activity Preparation Rubric

Team Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Indicator | Very strong evidence of skill  **5 – 4 points** | Moderate evidence of skill  **3 – 2 points** | Weak evidence of skill  **1 – 0 points** | Points Earned |
| Effective listening | Clearly evident that all team members are listening. | Listening occurs but distraction is evident. | Not listening to each other and/or talking over each other. |  |
| Oral communication | Clearly evident that all team members are discussing the topic. | Communication occurs but side conversations are occurring or two to three members dominating. | One member dominating conversation. |  |
| Demonstrated cooperation | Clearly all team members completing tasks, sharing written and oral solutions. Clearly all team members respected the input of other team members | Tasks primarily completed by two to three members, other members assist occasionally. Most team members respected the input of other team members. | Tasks primarily completed by one member, other members contributing only slightly. The team members did not respect the input of other team members. |  |
| Participated in the team preparation | Clearly all team members are engaged, attentive, and making notes for the full term of event.  Clearly all team members demonstrate efficient use of his/her time in comprising the plan. | Members are engaged and attentive with two to three making notes, participation fades over time.  Most team members demonstrate efficient use of his/her time in comprising the plan. | One to two members form the primary team, other members participate occasionally early, fade over time.  One to two team members demonstrate efficient use of his/her time in comprising the plan. |  |
|  |  |  | Total Points |  |

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**Team Food Safety Sanitation Report Form**

TEAM NAME (SCHOOL) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ SCORE \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

PLANT \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

LOCATION \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

INSPECTION TEAM MEMBERS’ STATE \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ TEAM NUMBER \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

PLANT CONTACT \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

CONTACT INFORMATION \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Category and Observation** | **Category**  **(20 points)** | **Observation (20 points)** | **Degree of Concern**  **Critical, Major, Minor**  **(20 points)** | **Recommendation or Corrective Action**  **(20 points)** |
| 1. General maintenance of physical facilities. 2. Cleaning and sanitizing of equipment and utensils. 3. Storage and handling of clean equipment and utensils. 4. Pest control. 5. Proper use and storage of cleaning compounds, sanitizers, and pesticides. 6. Employee training. 7. Plant design. 8. Quality assurance assessment. |  |  |  |  |

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**Customer Inquiry Scorecard**

**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Participant # \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Points Possible** | **Points Earned** |
| Scenario #1 - This issue represented in this scenario is a:   * Food Quality Issue * Food Safety Issue | \_\_\_\_\_  \_\_\_\_\_ | 2 |  |
| Is the concern or hazard primarily:   * Biological * Chemical * Physical | (check only one)  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ | 3 |  |
| Scenario #2 - This issue represented in this scenario is a:   * Food Quality Issue * Food Safety Issue | \_\_\_\_\_  \_\_\_\_\_ | 2 |  |
| Is the concern or hazard primarily:   * Biological * Chemical * Physical | (check only one)  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ | 3 |  |
| Scenario #3 - This issue represented in this scenario is a:   * Food Quality Issue * Food Safety Issue | \_\_\_\_\_  \_\_\_\_\_ | 2 |  |
| Is the concern or hazard primarily:   * Biological * Chemical * Physical | (check only one)  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ | 3 |  |
| Scenario #4 - This issue represented in this scenario is a:   * Food Quality Issue * Food Safety Issue | \_\_\_\_\_  \_\_\_\_\_ | 2 |  |
| Is the concern or hazard primarily:   * Biological * Chemical * Physical | (check only one)  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ | 3 |  |
| Scenario #5 - This issue represented in this scenario is a:   * Food Quality Issue * Food Safety Issue | \_\_\_\_\_  \_\_\_\_\_ | 2 |  |
| Is the concern or hazard primarily:   * Biological * Chemical * Physical | (check only one)  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ | 3 |  |
| **TOTAL** |  | **25** |  |

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**Food Safety and Sanitation Scorecard**

**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Participant # \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |
| --- |
| Situation #1 – the situation depicts a violation of FMP, sanitation and/or food handling/storage (1 point).  1a) Yes \_\_\_\_\_ 1b) No \_\_\_\_\_  If yes, list the item number that would best apply from the list of guidelines provided (1.5 points): 1c) \_\_\_\_\_ |
| Situation #2 – the situation depicts a violation of FMP, sanitation and/or food handling/storage (1 point).  2a) Yes \_\_\_\_\_ 2b) No \_\_\_\_\_  If yes, list the item number that would best apply from the list of guidelines provided (1.5 points): 2c) \_\_\_\_\_ |
| Situation #3 – the situation depicts a violation of FMP, sanitation and/or food handling/storage (1 point).  3a) Yes \_\_\_\_\_ 3b) No \_\_\_\_\_  If yes, list the item number that would best apply from the list of guidelines provided (1.5 points): 3c) \_\_\_\_\_ |
| Situation #4 – the situation depicts a violation of FMP, sanitation and/or food handling/storage (1 point).  4a) Yes \_\_\_\_\_ 4b) No \_\_\_\_\_  If yes, list the item number that would best apply from the list of guidelines provided (1.5 points): 4c) \_\_\_\_\_ |
| Situation #5 – the situation depicts a violation of FMP, sanitation and/or food handling/storage (1 point).  5a) Yes \_\_\_\_\_ 5b) No \_\_\_\_\_  If yes, list the item number that would best apply from the list of guidelines provided (1.5 points): 5c) \_\_\_\_\_ |
| Situation #6 – the situation depicts a violation of FMP, sanitation and/or food handling/storage (1 point).  6a) Yes \_\_\_\_\_ 6b) No \_\_\_\_\_  If yes, list the item number that would best apply from the list of guidelines provided (1.5 points): 6c) \_\_\_\_\_ |
| Situation #7 – the situation depicts a violation of FMP, sanitation and/or food handling/storage (1 point).  7a) Yes \_\_\_\_\_ 7b) No \_\_\_\_\_  If yes, list the item number that would best apply from the list of guidelines provided (1.5 points): 7c) \_\_\_\_\_ |
| Situation #8 – the situation depicts a violation of FMP, sanitation and/or food handling/storage (1 point).  8a) Yes \_\_\_\_\_ 8b) No \_\_\_\_\_  If yes, list the item number that would best apply from the list of guidelines provided (1.5 points): 8c) \_\_\_\_\_ |
| Situation #9 – the situation depicts a violation of FMP, sanitation and/or food handling/storage (1 point).  9a) Yes \_\_\_\_\_ 9b) No \_\_\_\_\_  If yes, list the item number that would best apply from the list of guidelines provided (1.5 points): 9c) \_\_\_\_\_ |
| Situation #10 – the situation depicts a violation of FMP, sanitation and/or food handling/storage (1 point).  10a) Yes \_\_\_\_\_ 10b) No \_\_\_\_\_  If yes, list the item number that would best apply from the list of guidelines provided (1.5 points): 10c) \_\_\_\_\_ |
| **TOTAL: \_\_\_\_\_/25 Possible Points** |