



# Food Science and Technology

## Purpose

*The New Jersey 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.*

## Objectives

The Food Science and Technology Career Development Event provides the opportunity for the participant to:

- Gain an awareness of career and professional food science and technology opportunities.
- Experience group participation and leadership responsibilities in a competitive food science and technology program.
- Develop technical competence and personal initiative in a food science and technology occupation.

## Event Rules

**NOTE: All rules and format are subject to change by discretion of the PA FFA Day officials and event coordinators. Those changes will be communicated through the event coordinators prior to the event. Please use this handbook as a guide, not as a guarantee of format.**

The complete rules, policies and procedures relevant to all New Jersey FFA Career and Leadership Development Events may be found in the CDE & LDE Event Participation Policy:

[https://nj.gov/agriculture/ag\\_ed/ffa/activity/CDE\\_LDE\\_Policy.pdf](https://nj.gov/agriculture/ag_ed/ffa/activity/CDE_LDE_Policy.pdf)

- Teams will consist of four members, and all four scores will count toward the team score.
- The team score is comprised of the combined scores of each individual and the team activity in which all team members will participate.
- Official Dress Is required for this event. Closed-toed shoes are a must.
- The event will be held rain or shine. Participants must come to the event prepared to work in adverse weather conditions.
- Any communication between participants during the event will be sufficient cause to eliminate the team from the event.
- Any participant caught cheating during the event will be expelled from the event.
- Participants are NOT allowed to use (or have visible) electronic devices during the event, unless for medical reasons or a portion of the event requires usage. This includes cell phones, tablets, etc. Participants will be allowed to use calculators, if specified for that event; however, cell phone calculators and graphing calculators are not permitted! Failure to adhere to these rules will result in disqualification.
- All individuals participating will judge in a cooperative manner following the rules set forth by the event coordinator.

- No school/chapter will use Rutgers University or Delaware Valley University facilities or locations for the training of teams. Contact with University faculty and staff is permissible. **Penalty will be disqualification.**
- There will be no separate alternate teams.
- A student may not compete in more than one event during the PA CDE Day Career Development Events.
- The State level competition fee of \$11 per contestant will be paid by the competing school. If a chapter is at least blue affiliated, registration to state FFA career development events is waived.

## Event Format

Each participant must provide these items:

- A clipboard that is clean and free of notes.
- Two sharpened No. 2 pencils.
- Calculator — Calculators used in this event must be non-programmable and non-graphing. Calculators should have only basic functions such as addition, subtraction, multiplication, division, equals, percent, square root, +/- key. No other calculators can be used during the event, including smartphones.

**Allergy Information:** Food products used in this event may contain or come in contact with potential allergens. Any participant needing reasonable ADA accommodation(s) for participation in the Food Science and Technology CDE should complete the online Request for Reasonable accommodations form found on page 7 of this handbook. The event committee will make all reasonable efforts to accommodate students with food allergies.

### Flow of Event

- General Knowledge Test
- Sensory Analysis (4 Triangle Tests, 4 Aroma ID)
- Problem Solving/Math Practicum
- Customer Inquiry
- Product Specification Compliance
- Modified Individual Food Safety/Sanitation Practicum

### INDIVIDUAL ACTIVITIES

#### *Objective Test (150 points possible per individual)*

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 created using the textbooks and websites specified in the reference section.

Team members will work individually to answer each of the 50 questions.

## PRACTICUMS

### *Problem Solving/Math Practicum (25 points possible per individual)*

- Participants will answer a series of five mathematical calculations based on common food science themes. Questions may include nutrition calculations, ingredient quantity, cost-benefit estimation of cost/margin of goods sold, conversions, processing conditions, etc.
- Example Question: The perfect glass of sweet tea is 20 percent sugar. Jim is making a one-gallon container of sweet tea. How many cups of sugar should he add?
  - 2.4 cups
  - 3.2 cups
  - 3.4 cups
  - 4 cups

### *Food Safety and Quality Practicums (50 points)*

#### **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 hazard (three points per scenario). This is for a total of 25 points.

#### **PRODUCT SPECIFICATION COMPLIANCE**

- Students 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 products are 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. (25 points)

### *Sensory Evaluation Practicums (40 points)*

#### **Triangle Tests**

- Four different triangle tests will be conducted. Participants must 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 five points.

#### **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)

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

*Modified Food Safety/Sanitation Practicum*

- Each participant will be given a situation (e.g., photos, videos, written scenarios, live demonstrations or a combination). The participant will evaluate the situation and complete a safety/sanitation report evaluation that will include observations, degree of concern and recommendations/corrective actions.

## Scoring

| Activities                     | Individual Points | Team Points |
|--------------------------------|-------------------|-------------|
| Math/Problem solving           | 25                | 100         |
| Food safety and quality        | 50                | 200         |
| Sensory evaluation             | 40                | 160         |
| Objective test                 | 150               | 600         |
| Food safety/sanitation report  | 20                | 80          |
| <b>MAXIMUM POINTS POSSIBLE</b> | 285               | 1,140       |

### TIEBREAKERS

*Team:*

1. Team product development
2. Team food safety/sanitation
3. Individual test (combined score)

*Individual:*

1. Written exam
4. Food safety and quality
5. Sensory evaluation

## Awards

Awards will be presented to individuals and the first place team based on their rankings at the CDE awards ceremony at the New Jersey State FFA Convention. Awards are sponsored by the National FFA Foundation and the New Jersey FFA Association.

The 1st place team will represent New Jersey at the National FFA Convention in October.

*Team*

- Plaque Sponsored by the National FFA Foundation – 1st place

*Individual*

- Overall Medals
  - Medals – Top three individuals
- H.O. Sampson Certificates (hands-on sections ONLY)
  - Certificate – Top five individuals

## References

*This list of references is not intended to be all-inclusive.* Other sources may be utilized, and teachers are encouraged to use the best instructional materials available. Make sure to use discretion when selecting website references using reputable, proven sites. The following list contains references that may prove helpful during event preparation. The most current edition of resources will be used.

- Past CDE materials and other resources are available on [FFA.org](http://FFA.org).

### EXAM REFERENCES

- Principles of Food Science. 4th edition. 2015. Janet Ward and Larry Ward. The Goodheart-Willcox Company, INC.
- 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, <http://www.FDA.gov>

### MATH/ PROBLEM SOLVING REFERENCE

The event will utilize the USDA Food Safety Inspection Service Processing Inspectors' Calculations Handbook (revised 1995) as the resource for the development of problem-solving problems relating to the following sections: Conversions (e.g., metric, US equivalents, grams, ounces, percent, ppm, Celsius, Fahrenheit); Pearson's Square; Percent of an ingredient in a formula; Yield; Shrink loss; Volume of a container; Calorie calculations; Total energy calculations. The resource can be found at this link: [https://www.fsis.usda.gov/sites/default/files/media\\_file/2020-07/7620.3.pdf](https://www.fsis.usda.gov/sites/default/files/media_file/2020-07/7620.3.pdf)

### GENERAL REFERENCES

- Penn State Kitchen Chemistry: Experiments, resources and materials for educators and students, <http://foodscience.psu.edu/public/kitchen-chemistry>
- Food Safety Education, <https://www.fsis.usda.gov/wps/portal/fsis/topics/food-safety-education/teach-others/download-materials/for-kids-and-teens/for-kids-and-teens>
- Partnership for Food Safety Education, <http://www.fightbac.org>
- FoodSafety.gov, <http://www.foodsafety.gov>
- Good Manufacturing Practices, <https://www.fda.gov/food/current-good-manufacturing-practices-cgmps/good-manufacturing-practices-gmps-21st-century-food-processing>
- Inspection Service Processing Inspectors' Calculations Handbook (revised 1995): <http://www.aamp.com/foodsafety/documents/Directive7620-3.pdf>
- The New and Improved Nutrition Facts Label - Key Changes, <https://www.fda.gov/media/99331/download>
- USDA Food Safety Inspection Service Processing Inspectors' Calculations Handbook (revised 1995) the collection of sample calculations for food processing relating to the following sections: Conversions (e.g., metric, US equivalents, grams, ounces, percent, ppm, Celsius, Fahrenheit); Pearson's Square; Percent of an ingredient in a formula; Yield; Shrink loss; Volume of a container; Calorie calculations; Total energy calculations. [https://www.fsis.usda.gov/sites/default/files/media\\_file/2020-07/7620.3.pdf](https://www.fsis.usda.gov/sites/default/files/media_file/2020-07/7620.3.pdf)

## Request for Reasonable Accommodations

The New Jersey FFA Association is committed to providing equal access to our events and activities for all people. Use this form to request a reasonable accommodation or assistance at least 3 weeks before any state-level events:

<https://form.jotform.com/NJFFA/accommodations-request>. A new form will need to be submitted for each event in which a reasonable accommodation is being requested. This information will be kept confidential and will be used only to process the request. Our staff will review the request upon receipt and contact the requestor with additional information. The association cannot guarantee accommodations or assistance if a form is received less than 3 weeks before an event. Accommodations being requested that require the assistance of another person (nurse, interpreter, scribe, reader, etc.) is the responsibility of the school/requestor. It is also the school/requestor's responsibility to provide any approved equipment to aide in the accommodation process, if applicable.

# Food Safety Sanitation Report Form

**80 POINTS**

Plant \_\_\_\_\_ Date \_\_\_\_\_

Location \_\_\_\_\_

Inspection Team Members' State \_\_\_\_\_ Team Number \_\_\_\_\_

Plant Contact \_\_\_\_\_

Contact Information \_\_\_\_\_

| Category   | Observation and Concern | Recommendation or Corrective Action |
|--|-------------------------|-------------------------------------|
| <ul style="list-style-type: none"><li>General maintenance of physical facilities</li></ul>           |                         |                                     |
| <ul style="list-style-type: none"><li>Cleaning and sanitizing of equipment and utensils</li></ul>    |                         |                                     |
| <ul style="list-style-type: none"><li>Storage and handling of clean equipment and utensils</li></ul> |                         |                                     |



| Category   | Observation and Concern | Recommendation or Corrective Action |
|--|-------------------------|-------------------------------------|
| <ul style="list-style-type: none"> <li>▪ Pest control</li> </ul>   |                         |                                     |
| <ul style="list-style-type: none"> <li>▪ Proper use and storage of cleaning compounds, sanitizers, and pesticides</li> </ul> |                         |                                     |
| <ul style="list-style-type: none"> <li>▪ Employee Training</li> </ul>  |                         |                                     |
| <ul style="list-style-type: none"> <li>▪ Plant Design</li> </ul>   |                         |                                     |
| <ul style="list-style-type: none"> <li>▪ Quality Assurance Assessment</li> </ul>   |                         |                                     |

Inspection Team Representative Signature \_\_\_\_\_

# Customer Inquiry Rubric

25 POINTS

| Chapter   | State | Team Number | Points Possible | Points Earned |
|---|-------|-------------|-----------------|---------------|
| <b>Scenario # 1:</b> This issue represented in this scenario is a:                                      |       |             | 2               |               |
| <input type="checkbox"/> Food Quality Issue <input type="checkbox"/> Food Safety Issue                  |       |             |                 |               |
| Is the concern or hazard primarily ( <i>Check only one</i> ):   |       |             | 3               |               |
| <input type="checkbox"/> Biological <input type="checkbox"/> Chemical <input type="checkbox"/> Physical |       |             |                 |               |
| <b>Scenario # 2:</b> This issue represented in this scenario is a:                                      |       |             | 2               |               |
| <input type="checkbox"/> Food Quality Issue <input type="checkbox"/> Food Safety Issue                  |       |             |                 |               |
| Is the concern or hazard primarily ( <i>Check only one</i> ):   |       |             | 3               |               |
| <input type="checkbox"/> Biological <input type="checkbox"/> Chemical <input type="checkbox"/> Physical |       |             |                 |               |
| <b>Scenario # 3:</b> This issue represented in this scenario is a:                                      |       |             | 2               |               |
| <input type="checkbox"/> Food Quality Issue <input type="checkbox"/> Food Safety Issue                  |       |             |                 |               |
| Is the concern or hazard primarily ( <i>Check only one</i> ):   |       |             | 3               |               |
| <input type="checkbox"/> Biological <input type="checkbox"/> Chemical <input type="checkbox"/> Physical |       |             |                 |               |
| <b>Scenario # 4:</b> This issue represented in this scenario is a:                                      |       |             | 2               |               |
| <input type="checkbox"/> Food Quality Issue <input type="checkbox"/> Food Safety Issue                  |       |             |                 |               |
| Is the concern or hazard primarily ( <i>Check only one</i> ):   |       |             | 3               |               |
| <input type="checkbox"/> Biological <input type="checkbox"/> Chemical <input type="checkbox"/> Physical |       |             |                 |               |
| <b>Scenario # 5:</b> This issue represented in this scenario is a:                                      |       |             | 2               |               |
| <input type="checkbox"/> Food Quality Issue <input type="checkbox"/> Food Safety Issue                  |       |             |                 |               |
| Is the concern or hazard primarily ( <i>Check only one</i> ):   |       |             | 3               |               |
| <input type="checkbox"/> Biological <input type="checkbox"/> Chemical <input type="checkbox"/> Physical |       |             |                 |               |
| <b>TOTAL</b>  |       |             | 25              |               |