American Meat Science Association

Food Safety & Science Certification

Study Guide

CERTIFICATION OVERVIEW

This certification verifies individuals possess an in-depth knowledge of food safety procedures and standards in the food industry. In addition, concepts such as chemical properties and processes, food handling and storage, food borne illnesses and principles of Hazard Analysis and Critical Control Points (HACCP) are assessed.

EXAM OVERVIEW

The AMSA Food Safety & Science Certification is hosted on the iCEV testing platform. The certification exam is a 100-question, randomized assessment. Exam questions are in the format of multiple choice, sort order, diagramming, matching, labeling and other question types meant to fully evaluate an individual's competency of the industry standards. The certification exam should be proctored within a controlled environment. The proctor of the exam must review and verify all exam procedures and provide electronic documentation through the exam platform.

More information about the certification exam and testing platform, including optional preparation materials offered by iCEV, can be found at https://www.icevonline.com/foodsafety

ABOUT THE AMERICAN MEAT SCIENCE ASSOCIATION

The American Meat Science Association is a broad-reaching organization of individuals that discovers, develops and disseminates its collective meat science knowledge to provide leadership, education and professional development. Their passion is to help meat science professionals achieve previously unimaginable levels of performance and reach even higher goals. They accomplish this by fostering a learning community of meat scientists, industry partners, outside thought leaders and other stakeholders who embrace this vision. Its members conduct basic and applied research and education programs in muscle growth and development, meat quality, food safety, processing technology and consumer and marketing issues relevant to the international meat industry. Learn more at https://meatscience.org/events-education/meat-industrycertifications

INDUSTRY STANDARDS

The certification exam assesses knowledge and skills from the following weighted industry standards set by AMSA:

FOOD CHEMISTRY PRINCIPLES- 20%

Chemical Properties of Food
Chemical Changes Related to Cooking & Food Processing Food Production Processes

FOOD HANDLING, PACKAGING & STORAGE PROCEDURES- 15%

Sanitary Food Handling Practices
Food Packaging Regulations
Cold Food Storage Methods
Food Additives
Food Preservation Techniques
Food Packaging & Labeling Guidelines

FOOD SAFETY & SANITATION METHODS- 15%

Workplace Safety Procedures
Food Industry Inspections
Foodborne Illness Prevention Strategies
Sanitation Procedures
Sanitation Laws & Regulations

HAZARD ANALYSIS CRITICAL CONTROL POINT (HACCP) SYSTEMS- 50%

Hazards in Food Processing
Hazard Analysis Process
Critical Control Points Identification
Establishing Critical Limits
Monitoring of Critical Limits
Methods for Taking Corrective Actions
Establishing Verification Procedures
Recordkeeping Procedures

Industry Standard Overview

To pass the AMSA Food Safety & Science Certification exam, certification candidates must have adequate knowledge of the industry standards. The following outlines an in-depth overview of the industry standards and sub-standards:

Industry Standard: Food Chemistry Principles

- Fermentation
- Caramelization
- Retrogradation
- Rate of Chemical Reactions
    - Concentration
    - Temperature
    - Pressure
- Smoke Point
- Chemical Changes
    - Nonenzymatic Browning
    - Leavening
    - Fermentation
- Food Deterioration & Spoilage
    - pH
    - Water Activity (Aw)
    - Temperature
- Solutions
- Emulsions
- Enzymes

Industry Standard: Food Handling, Packaging & Storage

- Food Irradiation
    - Electron Beams
    - X-rays
    - Gamma Rays
- Blanching
    - Water Blanching
    - Steam Blanching
    - Microwave Blanching

- Dehydration
    - Water Content of the Food
    - Sugar Content of the Food
    - Size of the Food
    - Amount of Air Circulation When Food is Dried
    - Level of Humidity in the Dehydrator
    - Type of Dehydrator
- Food Labels
- Modified Atmosphere Packaging (MAP)

Industry Standard: Food Safety & Sanitation Methods 

- Food Industry Safety
    - Regulations
        - Food Safety Inspection Service (FSIS)
    - Inspection
        - Food & Drug Administration (FDA)
- Foodborne Illness
- Vulnerable Populations
    - Senior Citizens
    - Pregnant Women
    - Young Children
    - Individuals with compromised immune systems such as those suffering from:
        - Cancer
        - Diabetes
        - Liver Disease
        - HIV
        - AIDS
- Food Storage Temperatures
- Temperature Danger Zone (TDZ)
- Cross-Contamination
- Common Foodborne Intoxications
    - Botulism
    - Perfringens Food Poisoning
    - Salmonellosis
    - Listeriosis
    - Hemolytic Uremic Syndrome

- Sanitation
- Food Contact Surfaces
    - Clothing
    - Gloves
    - Hands
    - Equipment
    - Utensils
- Cleaning & Sanitation Programs
- Sanitizers
    - Heat
    - Hot Water
    - Chemicals
    - Chlorine
    - Iodophors
    - Quaternary Ammonium Compounds (Quats)
    - Peracetic Acid (PAA)
- Sanitation Standard Operating Procedures (SSOPs)

Industry Standard: Hazard Analysis Critical Control Point (HACCP) Systems

- Hazard Analysis & Critical Control Points (HACCP) Seven Principles
    - Conduct a Hazard Analysis
    - Identify Critical Control Points (CCPs)
    - Establish Critical Limits for Each Critical Control Point
    - Establish Critical Control Point Monitoring Requirements
    - Establish Corrective Actions
    - Establish Record Keeping Procedures
    - Establish Procedures for Verifying the HACCP System is Working as Intended
- HACCP Plans
    - Assembly of a HACCP Team
    - Creation of a Description of a Food
    - Development of a Flow Diagram
- HACCP Coordinator Roles
- Hazards
    - Biological

- Physical
- Chemical

- Bacterial Contaminants
  - Sticking Knife
  - Digestive Tract
  - Hide
  - Feathers/Hair
  - Hooves
  - Processing Environment
  - Lymph Nodes
- Physical Contaminants
  - Foreign Materials Which Can Cause Injury
  - Glass
  - Metal Fragments
  - Rocks
- Chemical Contaminants
  - Allergens
  - Lubricants
  - Cleaning and Sanitizing Agents
  - Mycotoxins

Optional Preparation Materials Overview

The preparation materials offered by iCEV for the AMSA Food Safety & Science Certification was specifically created to prepare candidates for the certification exam. While it is not required to complete the preparatory materials before accessing the certification exam, AMSA recommends certification candidates complete some form of training. The following outlines the lessons scope and objectives:

Lesson 1: Background of the American Meat Science Association

1. To introduce students to the American Meat Science Association.
2. To state the purpose of the American Meat Science Association.

Lesson 2: Scientific Principles: Chemical Properties

1. To explain the periodic table of elements.
2. To identify and explain how chemical symbols, formulas and equations are used in food science.
3. To discuss elements, compounds, mixtures and formulas.
4. To compare elements and compounds.
5. To analyze chemical and physical changes in food.
6. To examine the occurrence of specific chemical reactions.

Lesson 3: Acids & Bases in Food Science

1. To identify the properties of acids and bases.
2. To describe the pH scale and how it is used.
3. To apply various indicators to measure the pH of substances.
4. To explain the importance of body pH.
5. To discuss ways pH is related to the properties of food.
6. To relate pH to food safety and freshness.

Lesson 4: Scientific Principles: Solutions & Emulsions

1. To describe heterogeneous and homogeneous mixtures.
2. To identify the solvent and solute in a given solution.
3. To discuss the effect of a solute and its concentration on the boiling and freezing points of a solution.
4. To calculate the concentration of a solution using mass percent.
5. To compare and contrast unsaturated, saturated and supersaturated solutions.
6. To describe the properties of colloidal dispersions.
7. To identify various food emulsions and the type of each emulsion.

Lesson 5: Scientific Principles: Enzymes

1. To describe how enzymes act as catalysts in chemical reactions.
2. To explain the relationship between an enzyme and a substrate.
3. To discuss the enzymes involved in digestion.
4. To identify factors that affect enzyme activity.
5. To explain how enzyme reactions are involved in food preparation.

Lesson 6: Chemical Processes in Food Science

1. To explain fermentation, leavening, retrogradation, syneresis, gelatinization and gelation.
2. To discuss the role of fermentation, leavening, retrogradation, syneresis and gelatinization in the food industry.
3. To compare pickling methods.
4. To describe the vinegar making process and bread making process.
5. To demonstrate food production processes while making pickles, sauerkraut, bread, quick breads, meringue and sauerkraut.

Lesson 7: The Science in Food Handling & Storage

1. To investigate food microbiology.
2. To explain the difference between food intoxication and food infection.
3. To examine the conditions of microbial growth.
4. To analyze sanitary food handling practices.
5. To discuss harmful and helpful food microorganisms.
6. To describe the use of food additives and their role in the food industry.
7. To identify agencies involved in regulating food additives.
8. To illustrate the steps of proper food freezing and storage.
9. To discuss the advantages and disadvantages of freezing food.

Lesson 8: The Science in Food Preservation

1. To explain dehydration and its uses.
2. To discuss the roles of air temperature and movement in dehydration.
3. To illustrate the role of canning in the food industry.
4. To identify the advantages and disadvantages of each canning method.

Lesson 9: Food Packaging Options & Guidelines

1. To research and explain food packaging guidelines.
2. To describe properties of containers used in commercial food packaging.
3. To identify factors and use of controlled atmosphere packaging.
4. To describe information required on a food label.

Lesson 10: Food Industry Safety

1. To identify and understand regulations and guidelines pertaining to the food industry.
2. To discuss the methods used to enforce food industry standards and regulations.
3. To explore responsibilities of managers and employees to ensure workplace safety in the food industry.

Lesson 11: It's Alive!: Foodborne Illnesses

1. To differentiate between food infection and food intoxication and define food safety terms.
2. To identify types of foodborne illnesses.
3. To determine methods of preventing foodborne illness.

Lesson 12: Sanitation & Safety Procedures in Food Production

1. To practice equipment maintenance and sanitation procedures.
2. To practice procedures relating to the safe manufacture of foods through hygienic food handling and processing.
3. To develop and maintain sanitation schedules.
4. To describe hazard analysis and critical control point implementation issues.
5. To research food safety laws regarding sanitation.
6. To describe solutions for different environmental issues in food sanitation (waste disposal).
7. To identify food industry inspection standards, including hazard analysis and critical control points.
8. To identify appropriate chemicals used in the food industry.
9. To assess conditions with regard to safety and health.
10. To conduct and interpret microbiological tests for food-borne pathogens and implement corrective procedures.
11. To explain the importance of record keeping in a food products and processing system.
12. To discuss documentation procedures in food products and processing system.
13. To demonstrate proper record keeping in food products and processing system.
14. To develop a cleaning program.
15. To demonstrate proper procedures for cleaning, dishwashing and cleaning the premises.

Lesson 13: Principles of HACCP: Introduction

1. To define HACCP and its purpose in the food industry.
2. To discuss the history of HACCP.
3. To introduce the seven principles of HACCP.

Lesson 14: Principles of HACCP: Identifying Hazards in Food Processing

1. To identify biological, chemical and physical hazards.
2. To examine sources of contamination in food processing.
3. To introduce methods of managing hazards in food processing.

Lesson 15: Principles of HACCP: Conducting a Hazard Analysis

1. To identify biological, chemical and physical hazards which occur in a food process.
2. To analyze the risk of hazards identified in the hazard analysis.

Lesson 16: Principles of HACCP: Identifying Critical Control Points

1. To define critical control points.
2. To demonstrate the process used when identifying critical control points.

Lesson 17: Principles of HACCP: Establishing & Monitoring Critical Limits and Taking Corrective Actions

1. To define critical limits for critical control points.
2. To demonstrate methods for monitoring critical limits.
3. To explain corrective actions which can be completed when deviations occur.

Lesson 18: Principles of HACCP: Establishing Verification Procedures

1. To define the verification.
2. To explain the importance of verification procedures.

Lesson 19: Principles of HACCP: Recordkeeping

1. To define the recordkeeping.
2. To explain the importance of proper recordkeeping and documentation.