Nutritional additives (e.g. niacin)

Color additives

Unintentionally or Incidentally Added Chemicals:
- Agricultural chemicals (e.g. pesticides, fungicides, herbicides, fertilizers, antibiotics and growth hormones)
- Prohibited substances (Code of Federal Regulations, Chapter 21, Section 189)
- Toxic elements and compounds (e.g. lead, zinc, arsenic, mercury, cyanide)
- Secondary direct and indirect
  - Plant chemicals (e.g. lubricants, cleaning compounds, sanitizers, paint)

Physical Hazard
- Foreign objects in food that can cause illness and injury
  - Commonly resulted from accidental contamination and poor food-handling practices
  - E.g. light bulb, nails, hair

Allergens
- Proteins that cause allergic reactions
- Cross-contact is when one food allergen come into contact with another food item and their proteins mix
- The BIG 8 refer to the allergens that cause the most reactions:
  - Milk, Soy, Egg, Fish, Tree Nuts, Peanuts, Crustaceans Shellfish and Wheat

Food Allergy
- Condition where body immune system responding to a food that it mistakenly believe is harmful
  - Immune response can be immediate and severe or delayed for a period of time with milder symptoms
  - Cannot be cured, prevention by avoiding food
  - Anaphylactic Reaction: Severe allergic reaction affecting whole body, often within minutes of consuming food resulting to death
  - Signs & Symptoms: Eczema, Itchy mouth, Swelling face, tongue, lips, Nausea or vomiting, Abdominal pain, Trouble breathing, Dizziness, Diarrhea

Bacteria
- Can be found anywhere
- All bacteria exists in vegetative state. Cells grow, reproduce and produce wastes
- Some have ability to form spares that help bacteria survive when environment is too hot, cold, dry, acidic or when not enough food present
- If the environmental conditions become suitable for growth, spores will turn to vegetative cell

Bacteria Growth
- Binary Fission - Bacteria reproduce when one cell divides to form two new cells
- Reproduction of bacteria and an increase in the number of organisms effective as bacterial growth
- Four phase:
  - Lag phase - bacteria exhibit little or no growth
  - Log phase - rapid growth, doubling in number every minute
  - Stationary phase - number of newly bacteria produced equal the number of organisms that are dying off
  - Decline phase - bacteria die off rapidly due to lack of nutrients and poisoned by own toxic wastes

FATTOM
- Food:
  - Suitable food supply most important for growth
  - Most bacteria prefers food high in protein or carbohydrates
- Acidity:
  - PH symbol used to designate acidity or alkalinity of food
  - Most bacteria prefer neutral environment (pH 7.0) but capable of growing in food that have a pH in range of (4.6 to 9.0)
  - Range of harmful bacteria growth (pH 4.6 to pH 7.0)
- Temperature:
  - Commonly measure in Fahrenheit (°F), degrees Celsius (°C) or both
  - All bacteria do not have the same temperature requirements for growth
  - Temperature Danger Zone - condition where most disease-causing bacteria growth at 41°F (5°C) to 135°F (57°C)
  - All cold food stored at 41°F (5°C) or below
  - All hot food stored at 135°F (57°C)
  - Temperature abuse - food not heated to a safe temperature or kept at the proper temperature

<table>
<thead>
<tr>
<th>Types of bacteria</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychrophilic</td>
<td>32°F (0°C) to 70°F (21°C)</td>
</tr>
<tr>
<td>Mesophilic</td>
<td>Between 70°F (21°C) and 110°F (43°C)</td>
</tr>
<tr>
<td>Thermophilic</td>
<td>Above 110°F (43°C)</td>
</tr>
</tbody>
</table>

- Time:
  - Bacteria cells double in number every 15 to 30 minutes
  - For most bacteria, a single cell can generate over 1 million cells in just 5 hours
  - Rule of Thumb bacteria needs 4 hours to grow to high enough numbers to cause illness
- Oxygen:
  - Bacteria have different oxygen requirements:
    - Aerobic - need oxygen
    - Anaerobic - cannot survive when there is oxygen, toxic to them
    - Facultative anaerobic - with or without oxygen
- Moisture:
  - The amount of water in food available to support bacterial growth is called water activity
Disease causing bacteria can only grow in foods that have a water activity higher than 0.85

**Campylobacter**
- Second most common bacterial cause of diarrhea in the US
- Sources: raw and undercooked poultry and other meat, raw milk and untreated water

**Clostridium botulinum**
- This organism produces a toxin which causes botulism, a life-threatening illness that can prevent the breathing muscles from moving air in and out of the lungs
- Sources: Improperly prepared home-canned foods; honey should not be fed to children less than 12 months old

**E. coli O157:H7**
- A bacterium that can produce a deadly toxin and causes approximately 73,000 cases of foodborne illness each year in US
- Sources: Beef, especially undercooked or raw hamburger; produce; raw milk; and unpasteurized juices and ciders

**Listeria monocytogenes**
- Causes listeriosis, a serious disease for pregnant women, newborns, and adults with a weakened immune system
- Sources: unpasteurized dairy products, including soft cheese; sliced deli meats; smoked fish; hot dogs; pate and deli-prepared salads (i.e. egg, ham, seafood, and chicken salads)

**Norovirus**
- The leading viral cause of diarrhea in the US. Poor hygiene causes Norovirus to be easily passed from person to person and from infected individuals to food items
- Sources: Any food contaminated by someone who is infected with the virus

**Salmonella**
- Most common bacterial cause of diarrhea in the US and the most common cause of foodborne deaths. Responsible for 1.4 million cases of foodborne illness a year
- Sources: Raw and undercooked eggs, undercooked poultry and meat, fresh fruits and vegetables, and unpasteurized dairy products

**Staphylococcus aureus**
- This bacterium produces a toxin that causes vomiting shortly after being ingested
- Sources: cooked foods high in protein (e.g. cooked ham, salads, bakery products, dairy products) that are held too long at room temperature

**Shigella**
- Causes an estimated 448,000 cases of diarrhea illnesses per year. Poor hygiene causes Shigella to be easily passed from person to person and from infected individuals to food items
- Sources: Salads, unclean water, and any food handled by someone who is infected with the bacterium

**Toxoplasma gondii**
- A parasite that causes toxoplasmosis, a very severe disease that can produce central nervous system disorders particularly mental retardation and visual impairment in children. Pregnant women and people with weakened immune systems are at higher risk
- Sources: raw or undercooked pork

**Vibrio vulnificus**
- Causes gastroenteritis, wound infection, and severe blood stream infections. People with liver diseases are especially at high risk
- Sources: Raw or undercooked seafood, particularly shellfish
Do NOT let customers refill dirty plates or use dirty utensils at self-service areas

Stock food displays with the correct utensils for dispensing food

**Labelling Bulk Food in Self-Service Areas**

- **A label is not needed for bulk unpackaged food, such as bakery products, if:**
  - The product makes no claim regarding health or nutrient content
  - No laws requiring labelling exist
  - The food is manufactured or prepared on the premises
  - The food is manufactured or prepared at another regulated food operation or processing plant owned by the same person

**Off-Site Service**

- **When delivering food off-site:**
  - Use insulated, food-grade containers designed to stop food from mixing, leaking or spilling
  - Clean the inside of delivering vehicles regularly
  - Check internal food temperatures
  - Label food with a use-by date and time, reheating, service instructions
  - Store raw meat, poultry and seafood and ready-to-eat items separately

- **When catering:**
  - Make sure the service site has the correct utilities
    - Safe waters for cooking, dishwashing and handwashing
    - Garbage containers stored away from food-prep, storage and serving areas
  - Use insulated containers to hold TCS food
  - Store ready-to-eat food separately from raw food
  - Provide customers with directions for handling leftovers

**Vending Machines**

- **To keep vended food safe:**
  - Check product shelf life daily
    - Refrigerated food prepped on-site and not sold in seven days must be thrown out
  - Keep TCS food at the correct temperature
  - Dispense TCS food in its original container
  - Wash and wrap fresh fruit with edible peels before putting it in the machine
Employee Orientation and Training
- SOP33 New Employee Orientation
  - SOP33a New Foodservice Employee Orientation - Food Safety Checklist

Food Safety and HACCP Training and Monitoring
- SOP34 Food Safety Training Program
  - SOP34a Annual Training Calendar
  - SOP34b Employee Training Planner
  - SOP34c Inservice Training Session Roster
- SOP35 Self Inspection for Continuous Quality Improvement
- SOP36 Food Safety Program Verification
- SOP37 Record Keeping and Documentation

Education & Training
- Successful implementation of HACCP - EDUCATION & TRAINING
  - Content of training should:
    - Provide overview of HACCP system
    - How it works to ensure safety
    - In-depth examination of CCPs and CL
- Primary goal - employees skilled in performing tasks which HACCP plan requires them to perform
- Training should be an ongoing activity
- Effective training and supervision - safe money, enhance safety

Roles & Responsibilities
- Health department personnel and regulator:
  - Promote the use of HACCP system
  - Review HACCP documents periodically to ensure CCPs properly identified, CL set, monitoring performed and HACCP plan revised
- Managers and supervisor:
  - Develop, implement, maintaining HACCP system
Resistant to damage

Dishwashing Machines
Dishwashers must be installed:
• So they are reachable and conveniently located
• In a way that keeps utensils, equipment and other food-contact services from becoming contaminated
• Following manufacturer’s instructions

When selecting dishwasher make sure:
• The detergents and sanitizers used are approved by the local regulatory authority
• They have the ability to measure water temperature, water pressure and cleaning and sanitizing chemical concentration
• Information about the correct settings is posted on the machine

Three-Compartment Sinks
Purchase sinks large enough to accommodate large equipment and utensils

Installing and Maintaining Equipment
Floor-mounted equipment must be either:
• Mounted on legs at least six inches (15 centimeters) high
• Sealed to a masonry base
Tabletop equipment should be either:
• Mounted on legs at least four inches (10 centimeters) high
• Sealed to the countertop

Once equipment has been installed:
• It must be maintained regularly
• Only qualified people should maintain it
• Set up a maintenance schedule with your supplier or manufacturer
• Check equipment regularly to make sure it is working correctly

Water Supply
Acceptable sources of drinking water:
• Approved public water mains
• Regularly tested and maintained private sources
• Closed, portable water containers
• Water transport vehicles

Plumbing
Cross-connection:
• Physical link between safe water and dirty water from:
  ➢ Desks
  ➢ Deavers
  ➢ Other wastewater sources

Backflow:
• Reverse flow of contaminants through a cross-connection into the drinkable water supply

Backsiphonage:
• A vacuum created in the plumbing system that sucks contaminants back into the water supply
  ➢ Can occur when high water use in one area of the operation creates a vacuum
  ➢ A running hose in a mop bucket can lead to backsiphonage

Backflow prevention methods:
• Vacuum breaker
• Air gaps

Sewage
If there is backup of sewage in the operation:
• The affected area should be closed right away
• The problem must be corrected
• The area must be thoroughly cleaned

If the backup is significant risk to food safety:
• Service must be stopped
• The local regulatory authority must be notified

Lighting
Consider the following when installing and maintaining lighting:
• Different areas of the facility have different lighting intensity requirements
• Local jurisdictions usually require prep areas to be brighter than other areas
• All lights should have shatter-resistant lightbulbs or protective covers
• Replace burned out bulbs with correct size bulbs
Guided discussion
➢ Games
➢ Role-play
➢ Demonstrations
➢ Jigsaw design
➢ Training videos and DVDs

Delivering Training

Methods for delivering training:
• Technology-based training
  ➢ Online training

Technology-based training is most appropriate when:
• Staff work in different locations and/or need the same training a different times
• It is too costly to bring staff to the same place
• Staff need to learn at their own pace