

Introduction to Food Technology

Introduction to Food Technology

Key concepts, processes, and applications

1. What Is Food Technology?

Aspect	Description
Definition	The scientific discipline that applies engineering, chemistry, microbiology, and nutrition to the production, preservation, packaging, distribution, and safety of food.
Goal	Deliver safe, nutritious, affordable, and appealing food to consumers while minimizing waste and environmental impact.
Scope	- Raw material handling - Processing & preservation - Packaging & labeling - Quality control & safety - Product development & innovation

2. Core Disciplines Integrated in Food Technology

Discipline	Role in Food Tech
Food Chemistry	Analyzes composition (proteins, fats, carbohydrates, vitamins, minerals) and chemical changes during processing.
Food Microbiology	Studies microorganisms that cause spoilage or disease and those used as starters (e.g., yeast, lactic acid bacteria).
Food Engineering	Designs equipment and processes (heat exchangers, dryers, mixers) for efficient large-scale production.
Nutrition Science	Ensures products meet dietary needs and health claims (e.g., low sodium, high fiber).
Sensory Science	Evaluates appearance, aroma, texture, and taste to meet consumer preferences.
Regulatory & Safety	Interprets food laws, standards, and hazard analysis (HACCP) to protect public health.

Introduction to Food Technology

3. Major Food Processing Operations

Operation	Principle	Typical Applications
Cleaning & Sorting	Physical removal of contaminants; size/weight grading.	Grains, fruits, seafood.
Milling & Grinding	Mechanical size reduction to increase surface area.	Flour, coffee, spices.
Thermal Processing	Heat destroys pathogens & enzymes (pasteurization, sterilization, UHT).	Milk, canned soups, juices.
Freezing & Cryogenic Cooling	Low temperatures slow microbial growth & biochemical reactions.	Ice cream, frozen vegetables, meat.
Drying & Dehydration	Water removal concentrates solids, extends shelf life.	Herbs, instant noodles, jerky.
Fermentation	Microbial metabolism transforms substrates into acids, alcohols, gases.	Yogurt, cheese, bread, soy sauce.
Extrusion	High shear, high temperature mixing pushes material through a die.	Breakfast cereals, pet food, snack bars.
Packaging	Barrier protection, portion control, information display.	Vacuum packs, MAP (Modified Atmosphere Packaging), aseptic cartons.

4. Food Preservation Techniques

Technique	Mechanism	Advantages	Limitations
Thermal (heat)	Denatures enzymes, kills microbes.	Proven, inexpensive.	Can affect flavor, nutrients.
Refrigeration/Freezing	Lowers temperature ? slows metabolic activity.	Retains freshness, nutrients.	Energy?intensive, requires cold chain.
Drying/Dehydration	Reduces water activity (a _w).	Lightweight, long shelf life.	May cause texture changes.
Fermentation	Produces organic acids, bacteriocins.	Improves flavor, adds probiotics.	Requires careful starter management.

Introduction to Food Technology

Technique	Mechanism	Advantages	Limitations
Chemical (preservatives)	Inhibits microbial growth (e.g., sorbates, nitrates).	Effective at	