# Unit 1: Introduction to Food Science and the Food Industry

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**Food Science and Technology**

- *Food science:* takes principles from basic sciences and applies them to study nature of food
- *Food technology:* development, process, preservation, packaging, and distribution of food

**Disciplines of Food Science**

**Major Disciplines**

*Food Chemistry*

- Examines the chemical composition and physical properties of foods
  - Ex: functional properties of macronutrients, chemistry of reactions during processing, food composition

*Food Microbiology*

- Examines the role of microorganisms in food
  - Ex: food spoilage, fermentations, identifying pathogenic microorganisms

*Food Processing*

- Techniques to prepare food safely, and to its highest nutritional quality
  - Ex: preservation, packaging, waste management, quality control

*Food Engineering*

- Applies physical and engineering principles to control unit operations
  - Ex: mass/heat transfer, fluid flow, mechanics, automation

**Other Disciplines**

*Food Market Factors*

- Information to ensure marketability of foods
  - Ex: sensory evaluation, communication, food industry trends, laws/regulations

**Food Industry Stakeholders**

- We are all stakeholders, because we all invest in eating
- *Chain of production* from raw agricultural food to finished products in home
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**Sectors of Stakeholders:**

- *Producers*
- *Processors*
- *Distributors*
  - *Food service/ retail*
    - *Consumers*

- *Consumers* purchase products, and can change the trends by demand
- *Producers and processors* are concerned with production aspects
  - Raw agriculture converted to *value-added* products by food preparation methods
- Marketing boards involved in supply management of raw foods and commodity prices
- *Distributors* mediate sale of products

- Trade and consumer associations act as advocates for interests of sectors- collecting stats, monitoring trends, consultations etc.

**Economic and Social Impact of Agri-Food Industry**

- Agriculture and food industry can contribute to gross domestic product, tax revenue, and employment
- Foreign sales markets demonstrate *globalization*
  - Issues that come with this are tariffs, food safety, food labelling, and product standards
- Examples of major global trading blocks:
  - European Union (EU), MERCOSUR (South America), North American Free Trade Agreement (NAFTA), Asia-Pacific Economic Cooperation (APEC)

**Global Food Issues**

- Issues affecting often non-industrialized countries (unlike Canada)
- *Food security:* access to enough food at all times for an active and healthy life. Including nutritionally adequate and safe foods, and guaranteed availability to acquire these foods in a socially acceptable way
- *Hunger:* uneasy or painful sensation caused by recurrent or involuntary lack of food, and could be a cause of food insecurity and could result in malnutrition
- The **Food and Agriculture Organization of the United Nations (FAO)** promotes agri-development, food security, and improving nutrition
- The **World Health Organization (WHO)** promotes safe food production, and surveys diseases for public health

**Food Composition**

- The substances or components in food, found by identifying nutrients
- *Key nutrients:* protein, carbohydrates, fats, water, minerals, vitamins, phytochemicals
- Food composition tables evaluate nutritional value, perform consumption surveys, counseling, and estimate nutritional content of individual diets

**Determining the Composition**

- Nutrient content is influenced by variety, season, geographical differences, stage of harvesting, handling, commercial processing, packaging, storage, display, home preparation, cooking, and serving
- *First system for food value:* chemically separates food into nutritive fractions, called **proximate analysis**

    - These included water, dry matter, crude protein, ether extract or fat, crude fibre, sugars and starches, and ash or total mineral
- *Newer methods for food value:* more specific nutrients can be identified, through **spectrophotometry** and liquid and gas **chromatography**
    - Can now identify fatty acids, cholesterol, amino acids. Specific minerals, and vitamins

**Energy in Food**

- Measured in terms of *calories*
- A **small calorie (cal)** is the amount of heat required to heat 1 gram of water from 14.5 C to 15.5 C
    - 1 cal = 4.1840 joules
- A **large calorie (kcal)** is the unit used to express the amount of energy that a food provides when consumed
- *Bomb calorimeters* determine the calorie content of food, where reaction happens in an enclosed steel bomb surrounded by water that absorbs the heat and increases the temperature

**Food Composition Table Abbreviations** found on page 91