Professional Master's Degree

Food Engineering Applied to Health

tech global university

tech global university

Professional Master's Degree

Food Engineering Applied to Health

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Global University**
- Accreditation: **60 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Website: **www.techtitute.com/us/nutrition/professional-masters-degree/food-engineering-applied-health**

Index

01

Introduction

The change in mentality around the very concept of nutrition has led the general population to increasingly look for healthy and wellness-producing foods. This has led manufacturers in the food industry to develop products that fit the concept of holistic health. A trend of particular interest to nutritionists who need to keep abreast of developments in the industry. That is why TECH has created this multidisciplinary Professional Master's Degree in which the professional will be brought up to speed on food technology, the relevant safety measures, as well as the biological and chemical fundamentals that underpin the development of foodstuffs. All this will be possible thanks to the advanced multimedia content included in this 100% online program, which can be accessed 24 hours a day.

With this Professional Master's Degree you will obtain the update you are looking for in the field of Food Engineering, exploring topics such as the implementation of quality systems in the elaboration of healthy food products"

The studies and research carried out in the fields of Biology and Chemistry, as well as the application of new technologies in the Food Industry sector, have led in recent years to an improvement in food development processes. This is in response to a society that demands healthier products and with a predilection for beverages and foods labeled as "plant-based".

Against this backdrop, the nutritionists must be aware of recent advances in this field, as well as the reformulations that will be carried out by manufacturers to meet demand. All of this, always in compliance with current food safety standards. A situation that has led TECH to create this Professional Master's Degree, where the nutritional specialist will learn about the latest developments in Food Engineering Applied to Health.

A program with a theoretical-practical approach that will take you deep into the fundamentals of biology, chemical engineering, food toxicology and food hygiene. This Professional Master's Degree will also place special emphasis on the technologies employed in this sector, which have improved considerably in recent decades with new techniques and systems for the evaluation, control and management of all aspects that can be tracked back to the food chain.

The nutritionists are also faced with a syllabus taught in an exclusively online format, which can be accessed at any time of the day, from an electronic device with an Internet connection. In addition, TECH uses the *Relearning* method, which will allow you to progress during the 12 months of this course, in a much more agile way, reducing the long hours of study so common with other methodologies. An ideal academic option for those who wish to update their knowledge through a Professional Master's Degree compatible with professional and/or personal responsibilities.

This **Professional Master's Degree in Food Engineering Applied to Health** contains the most complete and up-to-date scientific program on the market. Its most outstanding features are:

- The examination of case studies presented by experts in Food Engineering
- Graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice.
- Practical exercises where self-assessment can be used to improve learning.
- Its special emphasis on innovative methodologies
- Theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- Content that is accessible from any fixed or portable device with an Internet connection

In just 12 months you will learn about the most recent advances and studies in the field of Food Engineering and its current and future challenges"

TECH has designed a 100% online Professional Master's Degree aimed at professional nutritionists looking to update their knowledge of food engineering without neglecting other areas of their lives"

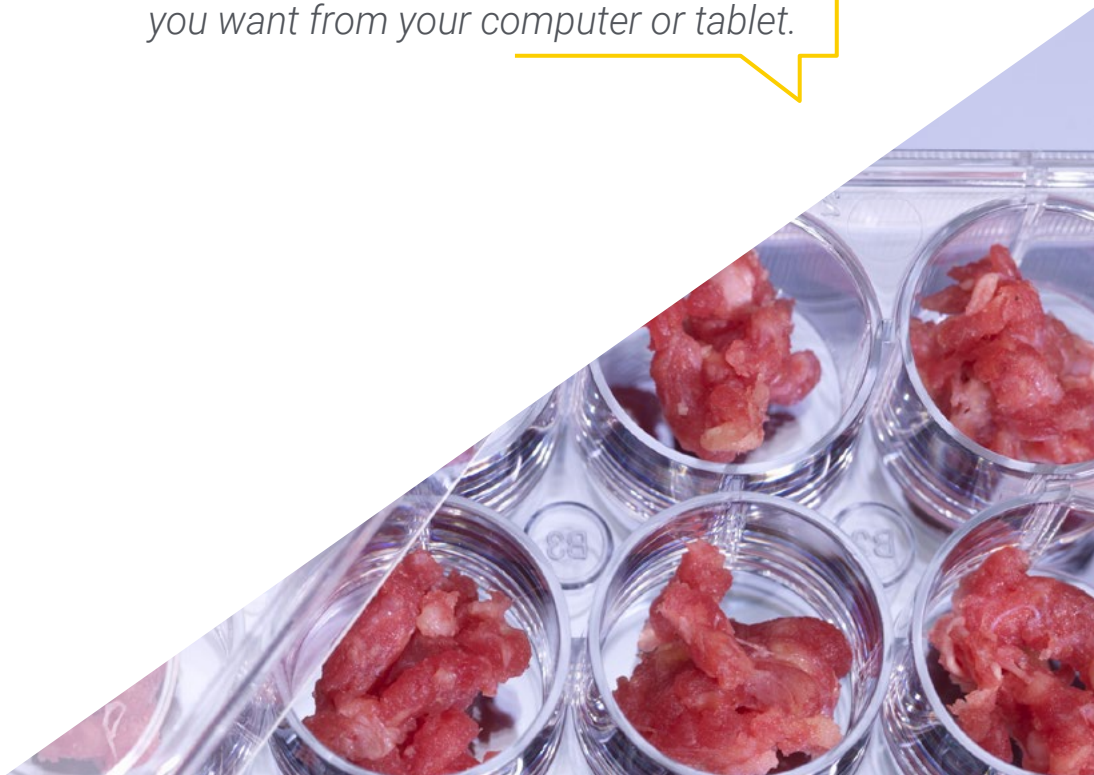
The Relearning system will take you in the main transformational, pathogenic and beneficial microorganisms in food in a much more dynamic and enjoyable way.

Delve into the health problems associated with the use of food additives whenever you want from your computer or tablet.

The program's teaching staff includes professionals from the sector who contribute their work experience to this educational program, as well as renowned specialists from leading societies and prestigious universities.

Its multimedia content, developed with the latest educational technology, will provide the professionals with situated and contextual learning, i.e., a simulated environment that will provide an immersive education programmed to learn in real situations.

The design of this program focuses on Problem-Based Learning, by means of which the professionals must try to solve the different professional practice situations that are presented throughout the academic course. For this purpose, the students will be assisted by an innovative interactive video system created by renowned experts.



02

Objectives

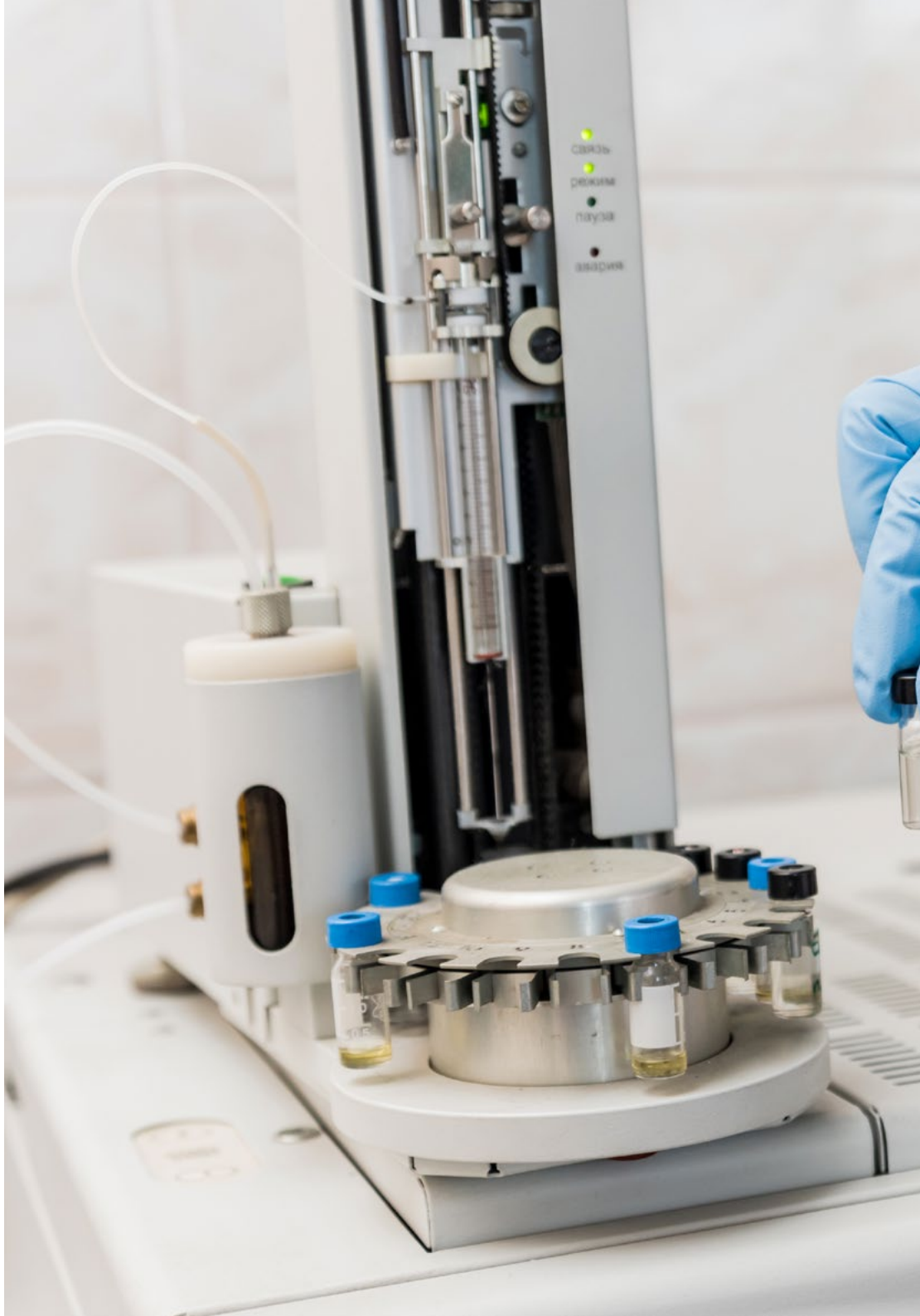
Food engineering has become vitally important in recent years due to an increase in consumption and the search for new and healthier products. This Professional Master's Degree provides the professionals with the most up-to-date information in this field, allowing the nutritionists to be up to date in food toxicology procedures, the influence of processing systems in the design of food manufacturing industries and the factors that influence production efficiency. Multimedia resources (Video summaries, detailed videos) will help to reinforce this knowledge.

You will access the latest information on food engineering that will enable you to debunk food hoaxes and detect food fraud"

General Objectives

- Identify and understand Biology as an experimental science through the application of the scientific method
- Explain key principles and how to apply them to population growth and the sustainable exploitation of natural resources
- Know and apply the procedures for toxicity assessment
- Contribute to consumer protection within the framework of food safety

You will be able to refresh your knowledge on food safety risk assessment and control processes thanks to this TECH program"



Specific Objectives

Module 1. Biology Fundamentals

- Develop ethical attitudes about the environmental balance that should exist in all food production and research processes, through the study of community and ecosystem dynamics
- Broaden your knowledge of cell structure and the differences between prokaryotes and eukaryotes, as well as the differences between animal, plant and fungal cells
- Acquire essential knowledge about the main functions of plants in terms of water economy and mineral nutrition, their transport systems, reproductive strategies and their relationship with the environment
- Know the main primary and secondary metabolites of interest in Food Science and Technology
- Apply knowledge on physiological aspects of plants relevant to food technology, such as gas exchange, respiration, primary and secondary metabolism
- Gain knowledge on the animals of interest for Food Science and Technology, their behavior and an awareness of how they are exploited
- Learn interesting points about plant development and its regulation by hormonal and environmental factors

Module 2. Chemical Engineering Fundamentals

- Interpret and elaborate flow diagrams from a process description
- Study and perform unit changes in magnitudes and equations
- Propose and solve matter and energy balances in systems with and without chemical reaction, in steady state and non-steady state, as well as in processes related to the food industry
- Address the mechanical energy balance, and apply it to simple cases of fluid flow through pipes
- Explore some of the most commonly used pressure measurement elements
- Apply the concepts and knowledge acquired to solve problems related to the food industry
- Pose and solve kinetic rate equations for the most common cases in batch and continuous reactors, in steady state
- Be familiar with the most common types of reactors used in the food industry, and to be able to perform design calculations of the most typical ones
- Identify possible uses of the studied concept in kinetics and reactors, and decide on their specific application

Module 3. Fundamentals of General Physiology

- Classify the nutrients that make up food
- Understand the range of factors that determine and condition nutrition
- Outline the metabolism of each nutrient and micronutrient, and their recommended intakes
- Understand different principles applied to physiological knowledge for human health
- Identify the factors influencing human nutrition
- Plan and implement health promotion and prevention programs
- Develop and establish food education guidelines
- Interpret the basic structure of the nervous and endocrine systems, as well as the action mechanisms of the respective hormones

Module 4. Food Toxicology

- Critically appraise and know how to use and apply sources of information related to nutrition, food, lifestyles and health related issues
- Examine the microbiology, parasitology and toxicology of foods
- Know the basic concepts of food toxicology
- Identify the different toxicokinetic processes (absorption, distribution, metabolism and excretion), as well as the general mechanisms of toxic action
- Recognize the sources of exposure, pathophysiology, toxic effects, and action mechanism of toxic substances present in food
- Apply strategies for toxicological risk assessment and identification of potentially toxic substances in food
- Know the most commonly used methods for the analysis of toxins in foodstuffs

Module 5. Microbiology and Food Hygiene

- To know the main tranformative, pathogenic and beneficial microorganisms in food
- Identify the most important elements of a microbiology laboratory
- Distinguish the physicochemical parameters that affect microbial growth in foods
- Evaluate the beneficial effects of microorganisms in foods
- Apply techniques for the detection of microorganisms in food

Module 6. Food and Public Health

- To know the distinguishing fact of human nutrition, interrelationships between nature and culture
- Acquire a good understanding of individual and social eating behaviors
- Identify health problems associated with the use of food additives
- Appreciate and recognize the sanitary and preventive importance of cleaning, disinfection, disinsecting and pest control programs in the food chain
- Classify the main social and economic implications of zoonoses

Module 7. Food Technology I

- Understand and use the basic fundamental principles and appropriate technological processes for food production, packaging and preservation
- Evaluate the impact of processing on food properties
- Determine the suitability of technological advances for food and process innovation in the food industry
- Know, understand and use agrifood industry facilities, their equipment and auxiliary machinery for the agrifood industry
- Control processes in the agri-food industry Model and optimize food processes

Module 8. Food Parasitology

- Know the microbiology and parasitology concepts and procedures relevant to the food industry
- Identify, analyze and evaluate parasitological risks throughout the food chain, from raw material collection to the distribution of the processed product to the final consumer
- Analyze and understand the main preventive measures with respect to microbiological and parasitological contamination of food at any stage of the food chain
- Know and identify the main foodborne parasites that cause human illnesses
- Identify and apply the main techniques for sampling and identification of parasites in food
- Appreciate and understand the ongoing importance of parasites and their relationship to food/nutrition

Module 9. Food Technology II

- Assess the factors involved in the elaboration of a project
- Build background knowledge for the study of specific food production technologies
- Establish the influence of processing systems on the design of manufacturing industries
- Analyze factors influencing efficiency in food production
- Know the basic aspects of specific food processing technologies according to the initial raw material and the resulting product
- Establish culinary treatments that guarantee an acceptable standards of quality for cooked dishes
- Establish working and food handling conditions in the preparation of cooked dishes

Module 10. Quality and Food Safety Management

- Design and evaluate tools that promote food safety management throughout the food chain to protect public health
- Identify and interpret the requirements of the food safety management standard (UNE EN ISO 22000) for its subsequent application and evaluation in food chain operators
- Develop, implement, evaluate and maintain appropriate hygiene practices, food safety and risk control systems
- Participate in the design, organization and management of different food services
- Collaborate in the implementation of quality systems
- Evaluate, control and manage aspects of traceability in the food supply chain

03

Skills

The Nutrition professional who enrols on this Professional Master's Degree will be able to enhance their skills in the identification and classification of nutrients found in each food, as well as the detection of the beneficial effects on health of certain microorganisms in the field of food It will also allow them to expand their skills to adapt energy and nutritional recommendations and requirements for each of their patients. The clinical case studies presented in this online program will be of great use and direct application in your daily practice.

Expand your skills to be able to tailor energy recommendations to each patient according to the specific properties of each food"

General Skills

- Know the mechanisms of food preservation and know how to prevent microbial spoilage of food
- Identify the beneficial effects of microorganisms in food
- Correctly classify and apply tabulated data, graphs, nomograms, as well as literature related to the subject matter
- Confidently handle the basic concepts of chemical kinetics applied to reactors in the food industry, definitions and nomenclature

With this Professional Master's Degree you will be catch up with the latest advances in Food Engineering and the use of new technologies"

Specific Skills

- Contribute towards consumer protection within the framework of food safety and quality
- Know how to identify and differentiate the main elements causing foodborne pathologies: microorganisms, toxins, viruses and parasites
- Know the fundamentals and general systems of disease prevention, health promotion and protection, as well as the etiologies and epidemiological factors relating to foodborne diseases
- Know and prevent the harmful effects of toxic substances in food, mechanism and the occurrence of these effects
- Collaborate in the prevention of food poisoning and know the safe limits for toxins, in order to guarantee safe food for the population
- Know how to evaluate the nutritional value of different diets and individual and collective nutritional status
- Know how to calculate, apply and adapt energy and nutritional recommendations and requirements

05

Structure and Content

The syllabus of this Professional Master's Degree has been designed so that the students can access the latest scientific findings and the most relevant technological advances in the field of Food Engineering during the 1,500 teaching hours it comprises. To this end, TECH has designed pedagogical tools that employ the latest technology for academic qualifications. In this way you can immerse yourself in biological sciences, chemistry, the basics of general physiology, food parasitology or safety systems implemented through ISO 22000 in a much more visual and dynamic way.

A 100% online Professional Master's Degree which will introduce you to the latest developments in food quality and safety"

Module 1. Biology Fundamentals

1.1. Biological Diversity
- 1.1.1. Biological Sciences Methodology: origin and history of life
- 1.1.2. Prokaryotic and Eukaryotic Cells: Origin of Meiosis, Sexual Reproduction, Diploidy and Haploidy
- 1.1.3. Synthetic Theory of Evolution
  - 1.1.3.1. Macroevolution and Microevolution of the Species
  - 1.1.3.2. Processes of Genetic drift and Morphological Adaptations
- 1.1.4. Classification of Living Organisms
  - 1.1.4.1. The Division in the Realms: Homology and Analogies
  - 1.1.4.2. Different Taxonomic Classification Systems

1.2. Protists and Fungi
- 1.2.1. General Characteristics of Protists
  - 1.2.1.1. Morphology and Function
  - 1.2.1.2. Protist Ecology
- 1.2.2. General Characteristics of Fungi
  - 1.2.2.1. Morphology and Function
  - 1.2.2.2. Classification of Fungi
  - 1.2.2.3. Ecology and Fungi
- 1.2.3. Main Stakeholders in Food Technology

1.3. Population Ecology
- 1.3.1. General Features of Population Ecology
- 1.3.2. Population Growth and its Regulation
  - 1.3.2.1. R and K Strategies
- 1.3.3. Types of Growth Curves
- 1.3.4. Human Population growth

1.4. Communities and Ecosystems
- 1.4.1. Community and Ecosystem Diversity
- 1.4.2. Ecosystem Disturbances: Natural and Anthropogenic Factors
- 1.4.3. Biogeochemical Cycles

1.5. General Plant Biology
- 1.5.1. General Plant Characteristics
- 1.5.2. Plant Metabolism and Nutrition
- 1.5.3. Characteristics of the Plant Cell
  - 1.5.3.1. Structure and Function
  - 1.5.3.2. Similarities with Animal Cells
- 1.5.4. Plant Organs and Tissues
  - 1.5.4.1. Root, Stem and Leaf
  - 1.5.4.2. Meristems

1.6. Nutritional Function in Plants
- 1.6.1. Water in the Plant: Water Relationships
- 1.6.2. Concept of Water Potential
- 1.6.3. Adaptations to the Conquest of the Terrestrial Environment
- 1.6.4. Absorption of Water and Nutrients
  - 1.6.4.1. Xylem Transport
  - 1.6.4.2. Phloem Transport

1.7. Photosynthetic Apparatus
- 1.7.1. Photosynthesis Process
  - 1.7.1.1. Luminous Phase
  - 1.7.1.2. Dark Phase
- 1.7.2. Energy Capture and Transduction
- 1.7.3. Fixation and Absorption of CO2
- 1.7.4. C3 Plants and Photorespiration
- 1.7.5. C4 Plants and CAM

1.8. Plant Growth and Reproduction
- 1.8.1. Concept of Growth and Differentiation
- 1.8.2. Plant Hormones: Types and Functions in Plants
- 1.8.3. Development of the Reproductive System
  - 1.8.3.1. Flowering and Ripening Process of Fruits and Seeds
  - 1.8.3.2. Types of Fruits and Seeds
  - 1.8.3.3. Seed Germination
  - 1.8.3.4. Aging and Ascission
- 1.8.4. Metabolites of Interest in Plants for Food Science and Technology

1.9. Invertebrate Animal Exploitation
- 1.9.1. Types of Animal Exploitation
- 1.9.2. Mollusks and Annelids: Conhiculture and Lumbriculture
- 1.9.3. Crustaceans and Insects: Astaciculture, Apiculture and Sericiculture

1.10. Vertebrate Animal Exploitation
- 1.10.1. Exploitation of Fish: Aquaculture
- 1.10.2. Amphibians and Reptiles
- 1.10.3. Exploitation of Birds: Aviculture
- 1.10.4. Mammals and Main Uses

Module 2. Chemical Engineering Fundamentals

2.1. Introduction to Chemical Engineering
- 2.1.1. The Chemical Process Industry: General Characteristics
- 2.1.2. Unit and Stage Operations
- 2.1.3. Stationary and Non-Stationary Regime
- 2.1.4. International System of Units
- 2.1.5. The Food Industry, Chemical Engineering and the Environment

2.2. Material Balance in Systems Without Chemical Reaction
- 2.2.1. General Formula for the Total Material Balance and Applied to a Component
- 2.2.2. Application of Material Balances: Systems with Bypass Current, Recirculation and Purge
- 2.2.3. Steady State Systems
- 2.2.4. Non-Steady State Systems

2.3. Material Balance in Systems with Chemical Reaction
- 2.3.1. General Concepts: Stoichiometric Equation, Stoichiometric Coefficient, Extensive and Intensive Conversion
- 2.3.2. Degree of Conversion and Limiting Reagent
- 2.3.3. Application of the Material Balances to Reactive Systems
  - 2.3.3.1. Reactor/Separator System with Recirculation of Unconverted Reactant
  - 2.3.3.2. Reactor/Separator System with Recirculation and Purge

2.4. Heat Energy Balances
- 2.4.1. Types of Energy: Formula for Total Energy Balance
- 2.4.2. Energy balance in Steady State and Non-Steady State Systems
- 2.4.3. Application of the Energy Balance in Reactive Systems
- 2.4.4. Heat Energy Balances

2.5. Mechanical Energy Balances
- 2.5.1. Mechanical Energy Balance
- 2.5.2. Bernoulli's Equation
- 2.5.3. Pressure Gauges: Manometers

2.6. Chemical Kinetics and Reactor Engineering
- 2.6.1. Definitions and Basic Concepts in Applied Chemical Kinetics and Reactor Engineering
- 2.6.2. Classification of Reactions Expression of Reaction Rate Equations
- 2.6.3. Study of the Dependence of Velocity on Temperature
- 2.6.4. Reactor Classification
  - 2.6.4.1. Ideal Reactors: Design Equations and Characteristics
  - 2.6.4.2. Problem Solving

2.7. Velocity Equations in Constant Volume Reactors
- 2.7.1. Rate Equations for Elementary Reactions: Integral and Differential Methods
- 2.7.2. Reversible Reactions
- 2.7.3. Parallel and Series Reactions
- 2.7.4. Problem Solving

2.8. Reactor Design for the Food Industry
- 2.8.1. General Characteristics of Reactor
- 2.8.2. Types of Ideal Reactors
  - 2.8.2.1. Discontinuous Ideal Reactor
  - 2.8.2.2. Steady-State Complete Mix Flow Reactor
  - 2.8.2.3. Stationary Piston Flow Reactor
- 2.8.3. Comparative Analysis of Reactors
- 2.8.4. Production: Optimum Reactor Size
- 2.8.5. Problem Solving

2.9. Chemical Thermodynamics and Solutions
- 2.9.1. Systems, States and State Functions. Work and Heat
- 2.9.2. Principles of Thermodynamics Enthalpy: Hess' Law
  - 2.9.2.1. Entropy and Gibbs Free Energy
  - 2.9.2.2. Solutions: Solubility and Saturation Solution Concentration

2.10. Chemical Equilibrium
- 2.10.1. Chemical Equilibrium Reaction Rate and Equilibrium Constant Formula
- 2.10.2. Types of Equilibria: Homogeneous and Heterogeneous
- 2.10.3. Displacement of Chemical Equilibrium: Le Chatelier's Principle
- 2.10.4. Solubility Equilibrium Precipitation Reactions

Module 3. Fundamentals of General Physiology

3.1. Physiology of Human Nutrition
- 3.1.1. Introduction to Nutrition, Concepts and Definitions
- 3.1.2. Body Composition and Main Nutrients
- 3.1.3. Digestive System and Digestion
  - 3.1.3.1. Digestive System Stages
  - 3.1.3.2. Digestive Regulators
- 3.1.4. Bioavailability of Nutrients

3.2. Carbohydrates
- 3.2.1. General Characteristics: Biochemistry and Classification
- 3.2.2. Digestion and Absorption of Carbohydrates: Physiological Utility
- 3.2.3. Food Sources and Recommended Carbohydrate Intakes
- 3.2.4. Pathologies Associated with Carbohydrate Ingestion

3.3. Dietary fiber:
- 3.3.1. General Characteristics: Biochemistry and Classification
- 3.3.2. Digestion and Absorption of Fibers: Physiological Utility
- 3.3.3. Food Sources and Recommended Intakes
- 3.3.4. Pathologies and Harmful Effects

3.4. Amino Acids and Proteins
- 3.4.1. General Characteristics: Amino Acids and Metabolism
  - 3.4.1.1. Protein Amino Acids
  - 3.4.1.2. Non Protein Amino Acids
- 3.4.2. Digestion and Absorption of Protein: Physiological Utility
- 3.4.3. Food Sources and Recommended Protein Intakes
- 3.4.4. Pathologies Associated with Protein Metabolism

3.5. Lipids
- 3.5.1. General Characteristics: Classification and Structure
  - 3.5.1.1. Structure and Special Properties of Cholesterol
  - 3.5.1.2. Structure and Special Properties of Lipoproteins
- 3.5.2. Digestion and Absorption of Lipids: Physiological Utility
- 3.5.3. Food Sources and Recommended Intakes
- 3.5.4. Pathologies Associated with Lipids Hypercholesterolemia

3.6. Minerals and Trace Elements
- 3.6.1. Introduction and Classification
- 3.6.2. Majority Minerals: Calcium, Phosphorus, Magnesium, Sulfur
- 3.6.3. Trace Elements: Copper, Iron, Zinc, Manganese, Manganese
- 3.6.4. Digestion and Absorption of Minerals: Bioavailability of Minerals
- 3.6.5. Food Sources and Recommended Intakes
- 3.6.6. Pathologies Associated with Minerals

3.7. Vitamins
- 3.7.1. General Characteristics: Structure and Function
  - 3.7.1.1. Hydrosoluble Vitamins
  - 3.7.1.2. Liposoluble Vitamins
- 3.7.2. Digestion and Absorption of Vitamins.: Physiological Utility
- 3.7.3. Food Sources and Recommended Intakes
- 3.7.4. Pathologies Associated with Vitamins
  - 3.7.4.1. B Group Vitamins
  - 3.7.4.2. Vitamin C
  - 3.7.4.3. Liposoluble Vitamins

3.8. Alcohol
- 3.8.1. Introduction and Consumption of Alcohol
- 3.8.2. Alcohol Metabolism
- 3.8.3. Recommended Daily Intakes and Caloric Contribution to the Diet
- 3.8.4. Harmful Effects of Alcohol Consumption

3.9. Energy Metabolism and Nutrient Interactions
- 3.9.1. Energy Content of Food
  - 3.9.1.1. Immediate Principles and Calorimetry
  - 3.9.1.2. Energy Needs of the Organism
- 3.9.2. Basal Metabolism and Physical Activity
  - 3.9.2.1. Metabolism During Intense Exercise: Cori Cycle
  - 3.9.2.2. Biochemical Process of Thermogenesis
- 3.9.3. Calculating Energy Needs
- 3.9.4. Interactions Between Nutrients
  - 3.9.4.1. Mineral-vitamin Interactions
  - 3.9.4.2. Protein-Vitamin Interactions
  - 3.9.4.3. Interactions Between Vitamins

3.10. Nervous System and Endocrine
- 3.10.1. Membrane and Action Potentials Active and Passive Transporters
- 3.10.2. Nervous System Structure and Cellular Organization
  - 3.10.2.1. Synapses and Neuronal Transmission
  - 3.10.2.2. Central and Peripheral Nervous System
  - 3.10.2.3. Autonomic System: Sympathetic and Parasympathetic
- 3.10.3. Endocrine Glands and their Hormones
  - 3.10.3.1. Pituitary Hormones and their Hypothalamic Regulation
  - 3.10.3.2. Thyroid and Parathyroid Hormones
  - 3.10.3.3. Sex Hormones
- 3.10.4. Endocrine System Pathologies

Module 4. Food Toxicology

4.1. Introduction to Food Toxicology
- 4.1.1. Introduction to Food Toxicology: historical evolution
- 4.1.2. Toxicological Concepts
  - 4.1.2.1. Types of Intoxication
  - 4.1.2.2. Classification of Toxic Substances
- 4.1.3. Dose-Effect and Dose-Response Relationships: Degrees of Uncertainty

4.2. Toxicokinetics
- 4.2.1. Toxic Action Stages
- 4.2.2. Exposure Phase Xenobiotics Routes of Entry
  - 4.2.2.1. Mechanisms for the Passage of Toxins Through Biological Membranes
- 4.2.3. Absorption Phase
- 4.2.4. Phase of Distribution, Fixation and Excretion of Toxics
- 4.2.5. Toxicokinetic Phase: Compartmental Models and Toxin Biotransformation

4.3. Toxics Biotransformation Processes
- 4.3.1. Phase I Reactions: Oxidation, Reduction, Hydrolysis and Hydration
- 4.3.2. Phase 2 Reactions: Sulfation, Glucuronidation, Methylation, Acetylation and Conjugation with Glutathione and Amino Acids
- 4.3.3. Toxicity Mechanisms and Factors that Modify Them

4.4. Toxicity Mechanisms and Associated Factors
- 4.4.1. Apoptosis and Necrosis
- 4.4.2. Mechanisms of Non-Specific and Specific Toxicity: Reversible and Irreversible Reactions
- 4.4.3. Immune Mechanisms: Food Allergies
- 4.4.4. Genetic and Environmental Factors

4.5. Toxicological Evaluation
- 4.5.1. Toxicological Assessment Procedures: General Effects Studies
  - 4.5.1.1. Acute Toxicity
  - 4.5.1.2. Chronic and Subchronic Toxicity
- 4.5.2. Study of Specific Effects; Carcinogenesis, Mutagenesis, Teratogenesis, and Effects on Reproduction
- 4.5.3. Alternative Methods: Biological Substrates and Toxicity Indicators

4.6. Natural Food Toxins
- 4.6.1. Seafood
  - 4.6.1.1. Shellfish Poisoning
  - 4.6.1.2. Fish Poisoning
- 4.6.2. Natural Vegetable Products
- 4.6.3. Anti-nutritional Substances
- 4.6.4. Intoxication by Higher Fungi

4.7. Chemical Contaminants in Food I
- 4.7.1. Inorganic Chemical Contaminants
  - 4.7.1.1. Lead, Mercury, Arsenic, Cadmium and Aluminum
  - 4.7.1.2. Toxic effects of Chlorides, Fluorides, Nitrates and Nitrites
- 4.7.2. Mycotoxins: Foods Most Commonly Implicated as Sources of Exposure
  - 4.7.2.1. Preventive Methods and Treatments
- 4.7.3. Pesticide Contamination: Classification and Toxicity
  - 4.7.3.1. Organochlorines: Dioxins, Furans and Polychlorinated Biphenyls
  - 4.7.3.2. Organophosphates: Carbamates and Bipyridyl Salts

4.8. Chemical Contaminants in Food II
- 4.8.1. Veterinary Drug Residues
  - 4.8.1.1. Main Toxic Effects
  - 4.8.2.1. Toxic Risk Assessment
- 4.8.2. Food Additives: Definition and Classification
- 4.8.3. Dietary Supplements: Vitamins, Minerals, and Other Supplements
  - 4.8.3.1. Adverse Effects
  - 4.8.3.2. Toxic By-Products

4.9. Biological Contamination
- 4.9.1. Toxic Effects of Biological Contaminants
- 4.9.2. Food poisoning
  - 4.9.2.1. Botulism
  - 4.9.2.2. Chinese Restaurant Diarrhea: *Bacillus Cereus*
  - 4.9.2.3. Toxic Shock Syndrome: *Staphylococcus Aureus*
- 4.9.3. Food Toxinfections
  - 4.9.3.1. Salmonellosis
  - 4.9.3.2. Listeriosis
  - 4.9.3.3. Toxinfection by E.coli

4.10. Risk Assessment and Food Carcinogens
- 4.10.1. Types of Food Carcinogens
- 4.10.2. Toxicological Risk Analysis
- 4.10.3. Toxicological Risk Evaluation
- 4.10.4. Toxicological Risk Characterization and Management

Module 5. Microbiology and Food Hygiene

5.1. Introduction to Food Microbiology
- 5.1.1. History of Food Microbiology
- 5.1.2. Microbial Diversity: Archaea and Bacteria
- 5.1.3. Phylogenetic Relationships Among Living Organisms
- 5.1.4. Microbial Classification and Nomenclature
- 5.1.5. Eukaryotic Microorganisms: Algae, Fungi and Protozoa
- 5.1.6. Virus

5.2. Introduction to Food Microbiology
- 5.2.1. Sterilization and Asepsis Methods
- 5.2.2. Culture Mediums: Liquid and Solid, Synthetic or Defined, Complex, Differential and Selective
- 5.2.3. Isolation of Pure Cultures
- 5.2.4. Microbial Growth in Discontinuous and Continuous Cultures
- 5.2.5. Influence of Environmental Factors on Growth

5.2.6. Optical Microscopy
5.2.7. Sample Preparation and Staining
5.2.8. Fluorescence Microscope
5.2.9. Transmission and Scanning Electron Microscopy

5.3. Microbial Metabolism
5.3.1. Ways of Obtaining Energy
5.3.2. Phototrophic, Chemolithotrophic and Chemorganotrophic microorganisms
5.3.3. Carbohydrate Catabolism
5.3.4. Degradation of Glucose to Pyruvate (Glycolysis, Pentose Phosphate Pathway and Entner-Doudoroff Pathway)
5.3.5. Lipid and Protein Catabolism
5.3.6. Fermentation
5.3.7. Types of Fermentation
5.3.8. Respiratory Metabolism: Aerobic Respiration and Anaerobic Respiration

5.4. Microbial Food Alterations
5.4.1. Microbial Ecology of Foods
5.4.2. Sources of Contamination of Vegetable Foods
5.4.3. Fecal Contamination and Cross Contamination
5.4.4. Factors Influencing Microbial Alteration
5.4.5. Microbial Metabolism in Food
5.4.6. Alteration Control and Preservation Methods

5.5. Foodborne Diseases of Microbial Origin
5.5.1. Foodborne Infections: Transmission and Epidemiology
5.5.2. Salmonellosis
5.5.3. Typhoid and Paratyphoid Fever
5.5.4. Campylobacter Enteritis
5.5.5. Bacillary Dysentery
5.5.6. Diarrhea Caused by Virulent E. coli Strains
5.5.7. Yersiniosis
5.5.8. Vibrio Infections

5.6. Diseases Caused by Foodborne Protozoa and Helminths
5.6.1. General Characteristics of Protozoa
5.6.2. Amoebic Dysentery
5.6.3. Giardiasis
5.6.4. Toxoplasmosis
5.6.5. Cryptosporidiosis
5.6.6. Microsporidiosis
5.6.7. Food-borne Helminths: Flatworms and Roundworms

5.7. Viruses, Prions and Other Foodborne Biohazards
5.7.1. General Properties of Viruses
5.7.2. Composition and Structure of the Virion: Capsid and Nucleic Acid
5.7.3. Virus Growth and Cultivation
5.7.4. Virus Life Cycle (lytic cycle): Phases of Adsorption, Penetration, Gene Expression and Replication, and Release
5.7.5. Alternatives to the Lytic Cycle: Lysogeny in Bacteriophages, Latent Infections, Persistent Infections and Tumor Transformation in Animal Viruses
5.7.6. Viroids, Virusoids and Prions
5.7.7. Incidence of Foodborne Viruses
5.7.8. Characteristics of Foodborne Viruses
5.7.9. Hepatitis A
5.7.10. Rotavirus
5.7.11. Scombroid Poisoning

5.8. Microbiological Analysis of Food
5.8.1. Sampling and Sampling Techniques
5.8.2. Reference Values
5.8.3. Indicator Microorganisms
5.8.4. Microbiological Counts
5.8.5. Determination of Pathogenic Microorganisms
5.8.6. Rapid Detection Techniques in Food Microbiology
5.8.7. Molecular Techniques: Conventional PCR and real-time PCR
5.8.8. Immunological Techniques

5.9. Beneficial Microorganisms in Food
- 5.9.1. Food Fermentation: The Role of Microorganisms in the Production of Foodstuffs
- 5.9.2. Microorganisms as Food Supplements
- 5.9.3. Natural Preservatives
- 5.9.4. Biological Systems of Food Conservation
- 5.9.5. Probiotic Bacteria

5.10. Microbial Cell biological
- 5.10.1. General Characteristics of Eukaryotic and Prokaryotic Cells
- 5.10.2. The Prokaryotic Cell: Components Outside the Cell Wall: Glycocalyx and S-layer, Cell Wall, Plasma Membrane
- 5.10.3. Flagella, Bacterial Mobility and Taxia
- 5.10.4. Other Surface Structures, Fimbriae and Pilli

Module 6. Food and Public Health

6.1. Human Nutrition and Historical Evolution
- 6.1.1. The Natural Element and the Cultural Element Biological Evolution, Tool Handling and Tool Making
- 6.1.2. The Use of Fire, Hunter-Gatherer Profiles Meat or Vegetarian
- 6.1.3. Biological, Genetic, Chemical and Mechanical Technologies Involved in Food Processing and Preservation
- 6.1.4. Food in Roman Times
- 6.1.5. Influence of the Discovery of America
- 6.1.6. Food in Developed Countries
  - 6.1.6.1. Food Distribution Chains and Networks
  - 6.1.6.2. The Global Trade "Network" and Small Businesses

6.2. Socio-Cultural Significance of Food
- 6.2.1. Food and Social Communication Social Relationships and Individual Relationships
- 6.2.2. Emotional Influence of Foods Parties and Celebrations
- 6.2.3. Relationships Between Diets and Religious Precepts Food and Christianity, Hinduism, Buddhism, Judaism, Islam
- 6.2.4. Natural Foods, Ecological Foods, and Organic Foods
- 6.2.5. Typology of Diets: The Standard Diet, Slimming Diets, Curative Diets, Magical Diets and Absurd Diets
- 6.2.6. Food Reality and Food Perception Protocol for Family and Institutional Meals

6.3. Communication and Eating Behavior
- 6.3.1. Written Media: Specialist Magazines Informative Magazines and Professional Journals
- 6.3.2. Audiovisual Media: Radio, Television, Internet. Packaging; Advertising
- 6.3.3. Eating Behavior: Motivation and Intake
- 6.3.4. Food Labeling and Consumption: Development of Likes and Dislikes
- 6.3.5. Sources of Variation in Food Preferences and Attitudes

6.4. Concept of Health and Diseases and Epidemiology
- 6.4.1. Health Promotion and Disease Prevention
- 6.4.2. Prevention Levels. BORRAR Laws of Public Health BORRAR
- 6.4.3. Food Characteristics Food as a Vehicle for Disease
- 6.4.4. Epidemiological Methods: Descriptive, Analytical, Experimental, Predictive

6.5. Sanitary, Social and Economic Significance of Zoonosis
- 6.5.1. Zoonosis Classification
- 6.5.2. Factors
- 6.5.3. Assessment Criteria
- 6.5.4. Action Plans:

6.6. Epidemiology and Prevention of Diseases Transmitted by Meat and Meat By-Products and Fish and Fish By-Products
- 6.6.1. Introduction. Epidemiological Factors of Meat-Borne Diseases
- 6.6.2. Consumption-based Diseases
- 6.6.3. Preventive Measures for Diseases Transmitted by Meat Products
- 6.6.4. Introduction. Epidemiological Factors of Fish Borne Diseases
- 6.6.5. Consumption-based Diseases
- 6.6.6. Prevention

6.7. Epidemiology and Prevention of Diseases Transmitted by Milk and Milk By-Products
- 6.7.1. Introduction. Epidemiological Factors of Meat-Borne Diseases
- 6.7.2. Consumption-based Diseases
- 6.7.3. Preventive Measures for Diseases Transmitted by Dairy Products

6.8. Epidemiology and Prevention of Diseases Transmitted by Bread, Pastries, Confectionery and Cakes
- 6.8.1. Introduction. Epidemiological Factors
- 6.8.2. Consumption-based Diseases
- 6.8.3. Prevention

6.9. Epidemiology and Prevention of Diseases Transmitted by Preserved and Semi-Preserved Foods, and by Edible Vegetables and Mushrooms
- 6.9.1. Introduction. Epidemiological Aspects of Preserved and Semi-Preserved Foods
- 6.9.2. Diseases Caused by Consumption of Canned and Semi-Canned Foods
- 6.9.3. Sanitary Prevention of Diseases Transmitted by Preserved and Semi-Preserved Foods
- 6.9.4. Introduction. Epidemiological Aspects of Vegetables and Mushrooms
- 6.9.5. Diseases Caused by Consumption of Vegetables and Mushrooms
- 6.9.6. Sanitary Prevention of Diseases Transmitted by Vegetables and Mushrooms

6.10. Health Problems Arising from the Use of Additives, Source of Food Poisoning
- 6.10.1. Naturally Occurring Toxins in Food
- 6.10.2. Toxins Due to Incorrect Handling
- 6.10.3. Use of Food Additives

Module 7. Food Technology I

7.1. Introduction to Food Science and Technology
- 7.1.1. Historical Development
- 7.1.2. Concept of Food Science and Technology
- 7.1.3. Objectives of Food Technology. Relationships With Other Sciences
- 7.1.4. Worldwide Food Industries

7.2. Preparation Methods Including Dry and Wet Preparation and Peeling
- 7.2.1. Reception of Food in the Food Industry and Preparation of Raw Material
- 7.2.2. Cleaning: Dry and Wet Methods
- 7.2.3. Selection and Classification
- 7.2.4. Main Peeling Methods
- 7.2.5. Peeling Equipment

7.3. Downsizing and Upsizing
- 7.3.1. General Objectives
- 7.3.2. Dry Food Size Reduction Equipment and Applications
- 7.3.3. Fibrous Food Size Reduction Equipment and Applications
- 7.3.4. Effect on Foods
- 7.3.5. Size Reduction of Liquid Foodstuffs: Homogenization and Atomization
  - 7.3.5.1. Equipment and Applications
- 7.3.6. Size Increase Techniques: Size Increase: Agglomeration, Instantaneization or Granulation

7.4. Causes and Factors Involved in Food Spoilage
- 7.4.1. Nature of the Causes of Food Spoilage
- 7.4.2. Factors Involved in Food Spoilage
- 7.4.3. Actions to Combat Physical and Chemical Spoilage
- 7.4.4. Possible Actions to Prevent or Delay Microbial Activity

7.5. Blanching Processing
- 7.5.1. General Aspects. Objectives
- 7.5.2. Blanching Methods: Steam, Hot Water and other Methods
- 7.5.3. Evaluation of Blanching in Fruits and Vegetables
- 7.5.4. Equipment and Facilities
- 7.5.5. Effects on the Nutritional and Sensory Properties of Foods

7.6. Fundamentals of Thermobacteriology
- 7.6.1. Basis of Thermobacteriology
- 7.6.2. Kinetics of Microbial Destruction by Heat
- 7.6.3. Survival Graph Value Concept D. Thermal Destruction Graphs
- 7.6.4. Z-value: Concept of Commercial Sterility
- 7.6.5. F and Fo Values Practical Examples of Heat Treatment Calculations in the Canning Industry

7.7. Pasterization
- 7.7.1. Concepts and Objectives
- 7.7.2. Types of Pasteurization Applications in the Food Industry
- 7.7.3. Effect on Foods
  - 7.7.3.1. Milk Pasteurization: Lactoperoxidase Test

7.8. Sterilization
- 7.8.1. Objectives
- 7.8.2. Sterilization of Packaged Foods
- 7.8.3. Filling, Evacuation and Closure of Containers
- 7.8.4. Types of Sterilizers: Discontinuous and Continuous TBI Treatment
- 7.8.5. Effect on Foods

7.9. Microwave Heating
- 7.9.1. General Aspects of Electromagnetic Radiation
- 7.9.2. Characteristics of Microwave
- 7.9.3. Dielectric Properties of the Material
- 7.9.4. Conversion of Microwave Energy into Heat Equipment Applications
- 7.9.5. Effect on Foods

7.10. Infrared Radiation
- 7.10.1. Theoretical Aspects
- 7.10.2. Equipment and Facilities Applications
- 7.10.3. Others Non-Ionizing Radiation

Module 8. Food Parasitology

8.1. Introduction to Food Parasitology
- 8.1.1. Fundamental concepts about Parasitology
- 8.1.2. Effects of Parasites in Food and Impact on Human Health
- 8.1.3. Socioeconomic Impacts of Foodborne Parasites
- 8.1.4. General Characteristics of the Major Groups of Parasites
  - 8.1.4.1 Life Cycles of the Major Groups of Parasites

8.2. General Characteristics of Protozoa in food
- 8.2.1. Digestive Tract Amoebae
  - 8.2.1.1. Entamoeba Histolytica: Morphology, Function, Transmission Mechanisms and Biological Cycle
  - 8.2.1.2. Other Amoebas of Interest in Food: Entamoeba Hartmanii and Entamoeba Coli
- 8.2.2. Digestive Tract scourge
  - 8.2.2.1. Giardia Lamblia: Morphology, Function, Mechanisms of Transmission and Life Cycle
  - 8.2.2.2. Other Flagellates in Food
- 8.2.3. Digestive Tract Apicomplexa
  - 8.2.3.1. General Biological Cycle
  - 8.2.3.2. Cryptosporidium: Morphology, Function, Transmission Mechanisms and Biological Cycle
  - 8.2.3.3. Cyclospora Cayetanensis: Morphology, Function, Transmission Mechanisms and Life Cycle
  - 8.2.3.4. Isospora Belli: Morphology, Function, Transmission Mechanisms and Biological Cycle
- 8.2.4. Digestive Tract Ciliates
  - 8.2.4.1. Balantidium Coli

8.3. General Characteristics of Helminths in food
- 8.3.1. General Characteristics of Helminths
- 8.3.2. General Characteristics of Trematodes
  - 8.3.2.1. Hepatic Trematodes: Fasciola Hepatica, Dicrocoelium Dendtricum, Clonorchis
  - 8.3.2.2. Pulmonary Trematodes: Pargonimus Westermanii
  - 8.3.2.3. Intesintal Trematodes: Fasciolopsis Buski
  - 8.3.2.4. Preventive Measures and Treatment of Diseases Caused by Trematodes
- 8.3.3. General Characteristics of Cestodes
  - 8.3.3.1. Digestive Cestodes: Diphyllobotrium Latum
  - 8.3.3.2. Tenias: Taenia Solium and Taenia Saginata
- 8.3.4. Cestode Preventive Measures and Treatments

8.4. Parasites Associated with Fish Products
- 8.4.1. Protozoa in Fish Products
  - 8.4.1.1. General Characteristics: Biological Cycle, Transmission, Reservoirs and Morphology
  - 8.4.1.2. Most Important Species
  - 8.4.1.3. Preventive and Remedial Measures
- 8.4.2. Helmintos in Fish Products
  - 8.4.2.1. General Characteristics: Biological Cycle, Transmission, Reservoirs and Morphology
  - 8.4.2.2. Most Important Species
  - 8.4.2.3. Preventive and Remedial Measures
- 8.4.3. General Identification Measures
- 8.4.4. Nematodes in Fishery Products: Life Cycle, Transmission, Reservoirs and Morfoligical
  - 8.4.4.1. Most Important Species
  - 8.4.4.2. Preventive and Remedial Measures

8.5. Parasites Associated with Farmed Meat and Meat By-Products
- 8.5.1. Protozoa Associated with Farmed Meat and Meat By-Products
  - 8.5.1.1. General Characteristics: Biological Cycle, Transmission, Reservoirs and Morphology
  - 8.5.1.2. Most Important Species
  - 8.5.1.3. Preventive and Remedial Measures
- 8.5.2. Helmintos Associated with Farmed Meat and Meat By-Products
  - 8.5.2.1. General Characteristics: Biological Cycle, Transmission, Reservoirs and Morphology
  - 8.5.2.2. Most Important Species
  - 8.5.2.3. Preventive and Remedial Measures

8.5.3. Nematodes Associated with Farmed Meat and Meat By-Products
8.5.3.1. General Characteristics: Biological Cycle, Transmission, Reservoirs and Morphology
8.5.3.2. Most Important Species
8.5.3.3. Preventive and Remedial Measures
8.5.4. Identification Methods for Parasites Associated with Farmed Meat and Meat By Products
8.6. Water-Associated Parasites
8.6.1. Water-Associated Protozoa
8.6.1.1. General Characteristics: Biological Cycle, Transmission, Reservoirs and Morphology
8.6.1.2. Study of the Most Important Species
8.6.1.3. Control and Prophylaxis Measures
8.6.2. Water-Associated Helmintos
8.6.2.1. General Characteristics: Biological Cycle, Transmission, Reservoirs and Morphology
8.6.2.2. Study of the Most Important Species
8.6.2.3. Control and Prophylaxis Measures
8.6.3. Nematodes Associated with Water Consumption
8.6.3.1. General Characteristics: Biological Cycle, Transmission, Reservoirs and Morphology
8.6.3.2 Study of the Most Important Species
8.6.3.3. Control and Prophylaxis Measures
8.6.4. General Identification Methods for Parasites Associated with Water Consumption
8.7. Parasites Associated with Fruits and Vegetables
8.7.1. Protozoa Associated with Fruits and Vegetables Consumption
8.7.1.1. General Characteristics: Morphology and Biology, Transmission Mechanisms
8.7.1.2. Most Important Species
8.7.1.3. Prophylaxis and Treatment Measures
8.7.2. Helminths Associated with Fruits and Vegetables Consumption
8.7.2.1. General Characteristics: Morphology and Biology, Transmission Mechanisms
8.7.2.2. Most Important Species
8.7.2.3. Prophylaxis and Treatment Measures

8.7.3. Nematodes Associated with Fruits and Vegetables Consumption
8.7.3.1. General Characteristics: Morphology and Biology, Transmission Mechanisms
8.7.3.2. Most Important Species
8.7.3.3. Prophylaxis and Treatment Measures
8.7.4. Identification and Characterization Methods
8.8. Disease-Producing Insects and Food Spoilage
8.8.1. Study of the Most Important Insects
8.8.1.1. General Characteristics: Biological Cycle, Transmission Mechanisms of and Morphology
8.8.1.2. Prophylaxis and Remedial Measures for Insects
8.8.1.3. Epidemiology and Distribution of Arthropods
8.8.2. Study of the Most Important Mites
8.8.2.1. General Characteristics: Biological Cycle, Transmission Mechanisms of and Morphology
8.8.2.2. Prophylaxis and Remedial Measures for Insects
8.8.2.3. Epidemiology and Distribution of Arthropods
8.8.3. Identification and Characterization Methods
8.9. Epidemiological Analysis of Foodborne Parasitosis
8.9.1. Points of Interest on the Geographical Origin of Food and the Parasite Biological Cycle in Food Transmission
8.9.2. Study of the Clinical Matters Associated with Parasites: Prepatent Period, the Appearance of Symptoms and the Presence of Asymptomatic Carriers in the Study of Food Outbreaks
8.9.3. Analysis of Actual Food Outbreaks in Different Settings: Towns, Hospitals, Nursing Homes, Schools, Restaurants, Social and Family Gatherings
8.10. Food-borne Parasites
8.10.1. The Importance of Food Spoiling Parasites
8.10.1.1. The Decline in the Production and Quality of Food and Plant and Animal Raw Materials
8.10.2. Pests of Plant Products and Derivatives
8.10.2.1. Protozoa, Helminths and Arthropods
8.10.2.2. Phytoparasites Points of Interest
8.10.3. Pests of Meat Products and Derivatives

8.10.3.1. Protozoa, Helminths and Arthropods
8.10.3.2. Socioeconomic Issue of Parasites in Domestic Livestock, Poultry and Farm Animals
8.10.4. Pests of Fish and Fish By-Products
8.10.4.1. Protozoa, Helminths and Arthropods
8.10.4.2. Socioeconomic Isuue of Fish Parasites

Module 9. Food Technology II

9.1. Technology of Refrigeration
9.1.1. Fundamentals of Preservation via Refrigeration
9.1.2. Effect of Refrigeration on the Chemical Reaction Rate and on Microbial Growth
9.1.3. Factors to be Monitored During Refrigerated Storage Effect on Foods
9.2. Technology of Freezing
9.2.1. Process and Stages of Freezing: Theory of Crystallization
9.2.2. Freezing Curves Modification of Foods During Freezing
9.2.3. Effects on Chemical and Biochemical Reactions
9.2.4. Effects on Microorganisms Defrosting
9.3. Cold Production Systems
9.3.1. Calculating Refrigeration and Freezing Requirements
9.3.2. Calculation of Freezing Time Cold Production Systems
9.3.3. Refrigerators and Refrigerated Storage
9.3.4. Freezers and Frozen Storage
9.3.5. Vapor Compression and Cryogenic Systems
9.4. Technology of Dehydration
9.4.1. Concept, Goals and Foundation
9.4.2. Psychrometry and Applications of the Psychrometric Diagram
9.4.3. Drying Speed. Drying Phases and Curves
9.4.4. Effects of Dehydration on Foodstuffs
9.4.5. Equipment, Installations and Applications
9.5. Freeze-Drying and Concentration Freezing
9.5.1. Theoretical Fundamentals Freeze-drying Systems
9.5.2. Applications. Effect on Foods
9.5.3. Freezing Concentration: Fundamentals and Objectives
9.6. Reduction of the Water Activity in Food Via the Addition of Solutes
9.6.1. Main Water Activity Reducing Agents and How They Act
9.6.2. Salting Technology: Salting Methods, Effects on Foodstuffs
9.6.3. Addition of Sugars and Other Chemical Agents as Depressants of Water Activity
9.6.4. Effect on Foods
9.7. Smoking Technology
9.7.1. Definition and Composition of Smoke Smoke Production Systems
9.7.2. Smokehouse Characteristics Smoking Techniques
9.7.3. Effect on Foods
9.7.4. Applications in the Food Industry
9.8. Packaging Technology
9.8.1. Purposes of Packaging
9.8.2. Design of Packaging and Materials for Manufacture
9.8.3. Analysis of the Interactions Between Packaging and Food Packaging and Dosing Systems
9.8.4. Container Closure and Closure Control Checks Packaging for Distribution
9.8.5. Container Labeling
9.9. Material Transport Systems
9.9.1. Material Transport Systems. Transporters
9.9.2. Pneumatic Equipment Cranes and Vehicles
9.9.3. Temperature Regulated Food Transportation
9.10. Food Preparation Industries and the Preparation of an Industrial Kitchen
9.10.1. Concepts and Objectives of Culinary Science and Technology The Professional Culinary Space
9.10.2. Culinary Techniques

Module 10. Quality and Food Safety Management

10.1. Food Safety and Consumer Protection
10.1.1. Definition and Basic Concepts
10.1.2. Quality and Food Safety Evolution
10.1.3. Situation in Developing and Developed Countries
10.1.4. Key Food Safety Agencies and Authorities: Structures and Functions
10.1.5. Food Fraud and Food Hoaxes: The Role of the Media

10.2. Facilities, Premises and Equipment
- 10.2.1. Site Selection: Design and Construction and Materials
- 10.2.2. Premises, Facilities and Equipment Maintenance Plan
- 10.2.3. Applicable Regulations BORRAR

10.3. Cleaning and Disinfection Plan (L + D)
- 10.3.1. Dirt Components
- 10.3.2. Detergents and Disinfectants: Composition and Functions
- 10.3.3. Cleaning and Disinfection Stages
- 10.3.4. Cleaning and Disinfection Programming
- 10.3.5. Current Regulations BORRAR

10.4. Pest Control
- 10.4.1. Pest Control and Disinsection (Plan D + D)
- 10.4.2. Pests Associated with the Food Chain
- 10.4.3. Preventive Measures for Pest Control
  - 10.4.3.1. Traps and Snares for Mammals and Ground Insects
  - 10.4.3.2. Traps and Snares for Flying Insects

10.5. Traceability Plan and Good Manipulation Practices (GMP)
- 10.5.1. Structure of a Traceability Plan
- 10.5.2. Current Regulations Associated with Traceability BORRAR
- 10.5.3. GMP Associated with Food Processing
  - 10.5.3.1. Food Handlers
  - 10.5.3.2. Requirements to be Met
  - 10.5.3.3. Hygiene Training Plans

10.6. Elements in the Management of Food Safety
- 10.6.1. Water as an Essential Element in the Food Chain
- 10.6.2. Biological and Chemical Agents Associated with Water
- 10.6.3. Quantifiable Elements of Quality, Safety and Use of Water
- 10.6.4. Approval of Suppliers
  - 10.6.4.1. Supplier Monitoring Plan
  - 10.6.4.2. Current Regulations Associated BORRAR
- 10.6.5. Food Labeling
  - 10.6.5.1. Consumer Information and Allergen Labeling
  - 10.6.5.2. Labeling of Genetically Modified Organisms

10.7. Food Crisis and Associated Policies
- 10.7.1. Triggering Factors of a Food Crisis
- 10.7.2. Scope, Management and Response to the Food Security Crisis
- 10.7.3. Alert Communication Systems
- 10.7.4. Policies and Strategies for Improving Food Quality and Safety

10.8. HACCP plan design
- 10.8.1. General Guidelines to be Followed for its Implementation: principles on which it is based and pre-requisite program
- 10.8.2. Management Commitment
- 10.8.3. Configuration of HACCP
- 10.8.4. Description of the Product and Identification of its Intended Use
- 10.8.5. Flow Diagrams

10.9. Development the HACCP Plan
- 10.9.1. Defining Critical Control Points (CCPs)
- 10.9.2. The Seven Basic Principles of the HACCP Plan
  - 10.9.2.1. Requirements Identification and Analysis
  - 10.9.2.2. Establishment of Control Measures for Identified Hazards
  - 10.9.2.3. Determination of Critical Control Points (CCP)
  - 10.9.2.4. Defining Critical Control Points (CCPs)
  - 10.9.2.5. Establishment of Critical Limits
  - 10.9.2.6. Determination of Corrective Actions
  - 10.9.2.7. HACCP System Checks

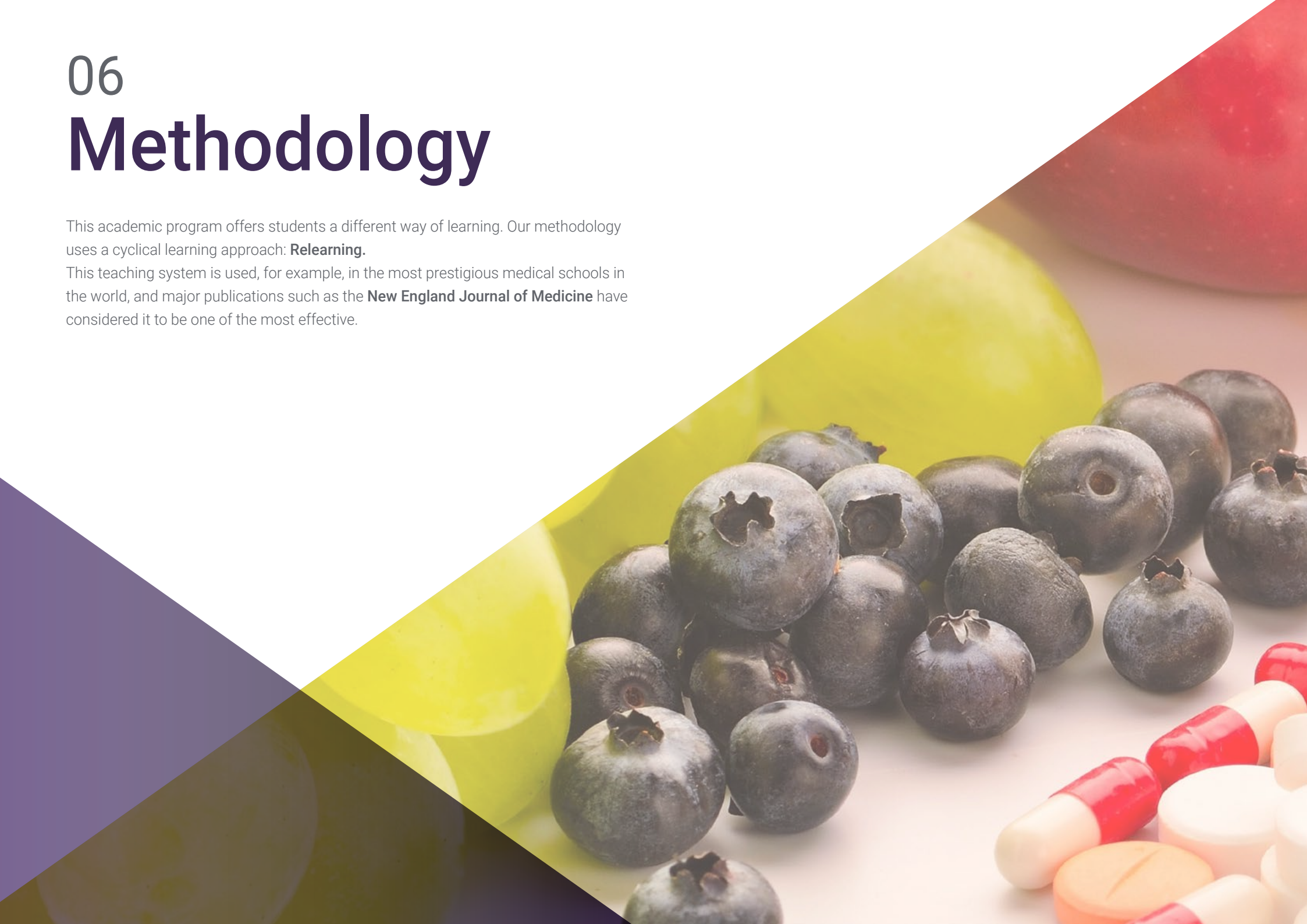
10.10. ISO 22000
- 10.10.1. ISO 22000 Principles
- 10.10.2. Purpose and Field of Application
- 10.10.3. Market Situation and Position in Relation to Other Applicable Standards in the Food Chain
- 10.10.4. Application Requirements
- 10.10.5. Food Safety Management Policy

06

Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning.**

This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.

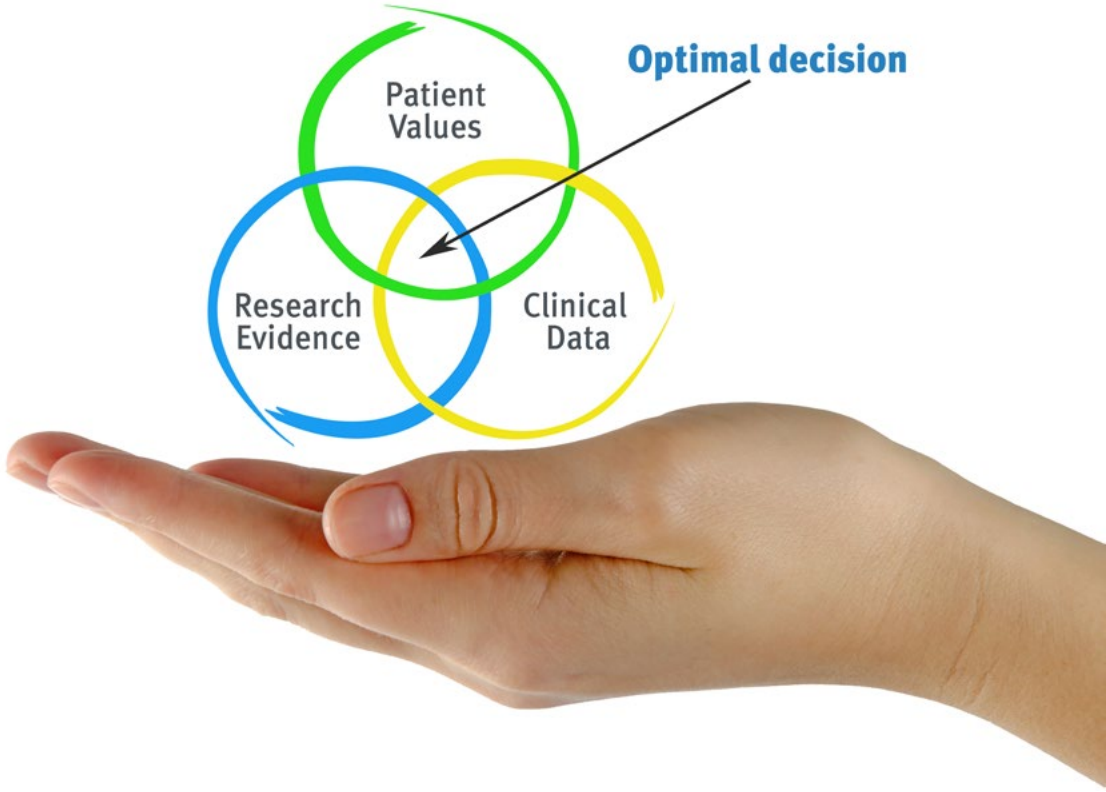


Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"

At TECH we use the Case Method

In a given situation, what should a professional do? Throughout the program, students will face multiple simulated clinical cases, based on real patients, in which they will have to do research, establish hypotheses, and ultimately resolve the situation. There is an abundance of scientific evidence on the effectiveness of the method. Specialists learn better, faster, and more sustainably over time.

With TECH, nutritionists can experience a way of learning that is shaking the foundations of traditional universities around the world.



According to Dr. Gérvas, the clinical case is the annotated presentation of a patient, or group of patients, which becomes a "case", an example or model that illustrates some peculiar clinical component, either because of its teaching power or because of its uniqueness or rarity. It is essential that the case is based on current professional life, trying to recreate the real conditions of professional nutritional practice.

Did you know that this method was developed in 1912, at Harvard, for law students? The case method consisted of presenting students with real-life, complex situations for them to make decisions and justify their decisions on how to solve them. In 1924, Harvard adopted it as a standard teaching method"

The effectiveness of the method is justified by four fundamental achievements:

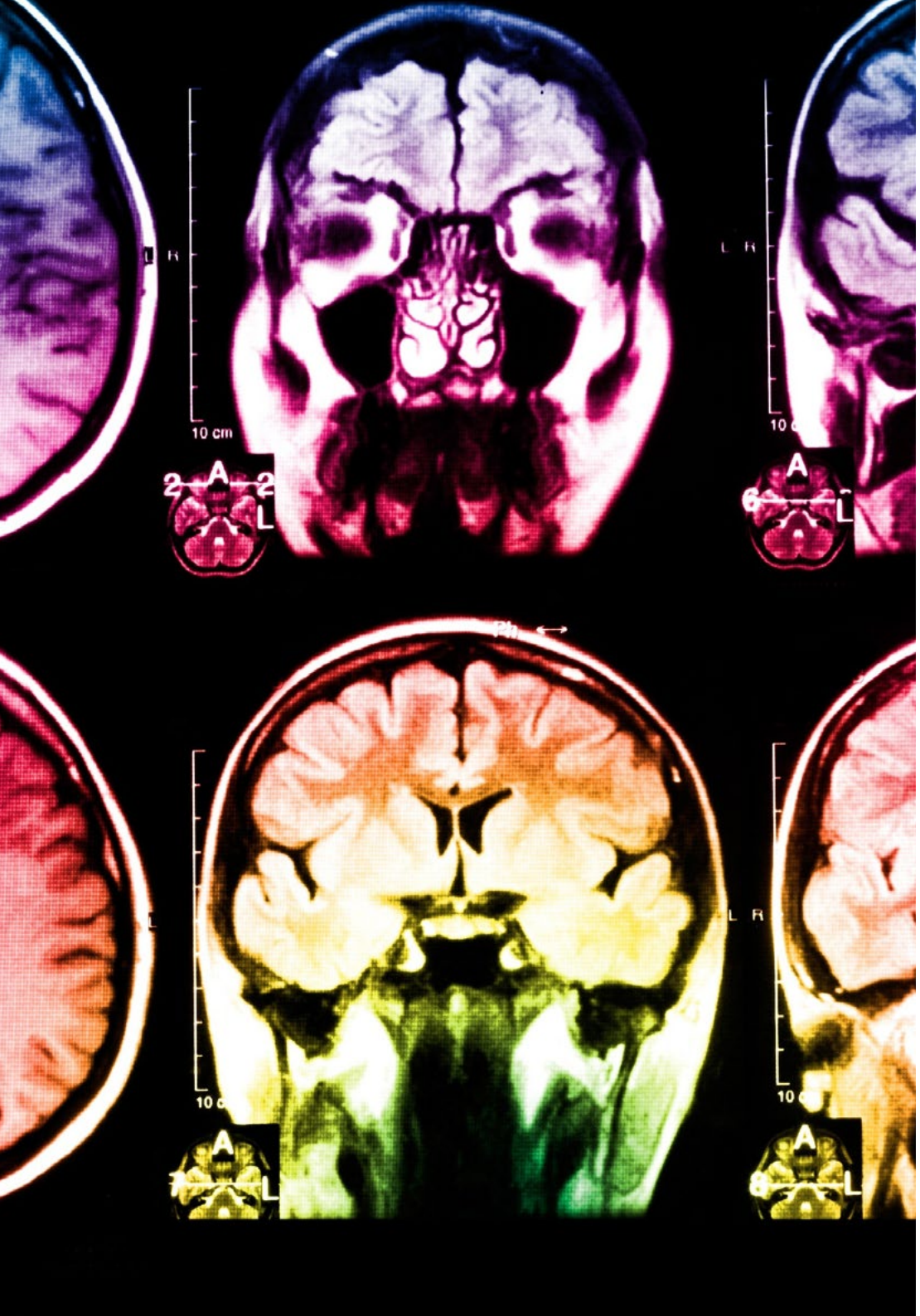
1. Nutritionists who follow this method not only achieve the assimilation of concepts, but also a development of their mental capacity through exercises to evaluate real situations and the application of knowledge.
2. Learning is solidly translated into practical skills that allow the nutritionist to better integrate knowledge into clinical practice.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life.
4. Students like to feel that the effort they put into their studies is worthwhile. This then translates into a greater interest in learning and more time dedicated to working on the course.

Relearning Methodology

At TECH we enhance the case method with the best 100% online teaching methodology available: Relearning.

This university is the first in the world to combine the study of clinical cases with a 100% online learning system based on repetition, combining a minimum of 8 different elements in each lesson, a real revolution with respect to the mere study and analysis of cases.

The nutritionist will learn through real cases and by solving complex situations in simulated learning environments. These simulations are developed using state-of-the-art software to facilitate immersive learning.



At the forefront of world teaching, the Relearning method has managed to improve the overall satisfaction levels of professionals who complete their studies, with respect to the quality indicators of the best online university (Columbia University).

With this methodology, more than 45,000 nutritionists have been trained with unprecedented success in all clinical specialties regardless of the surgical load. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

Relearning will allow you to learn with less effort and better performance, involving you more in your training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.

In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically.

The overall score obtained by TECH's learning system is 8.01, according to the highest international standards.

This program offers the best educational material, prepared with professionals in mind:

Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.

Nutrition Techniques and Procedures on Video

TECH brings students closer to the latest techniques, the latest educational advances and to the forefront of current nutritional counselling techniques and procedures. All of this in direct contact with students and explained in detail so as to aid their assimilation and understanding. And best of all, you can watch the videos as many times as you like.

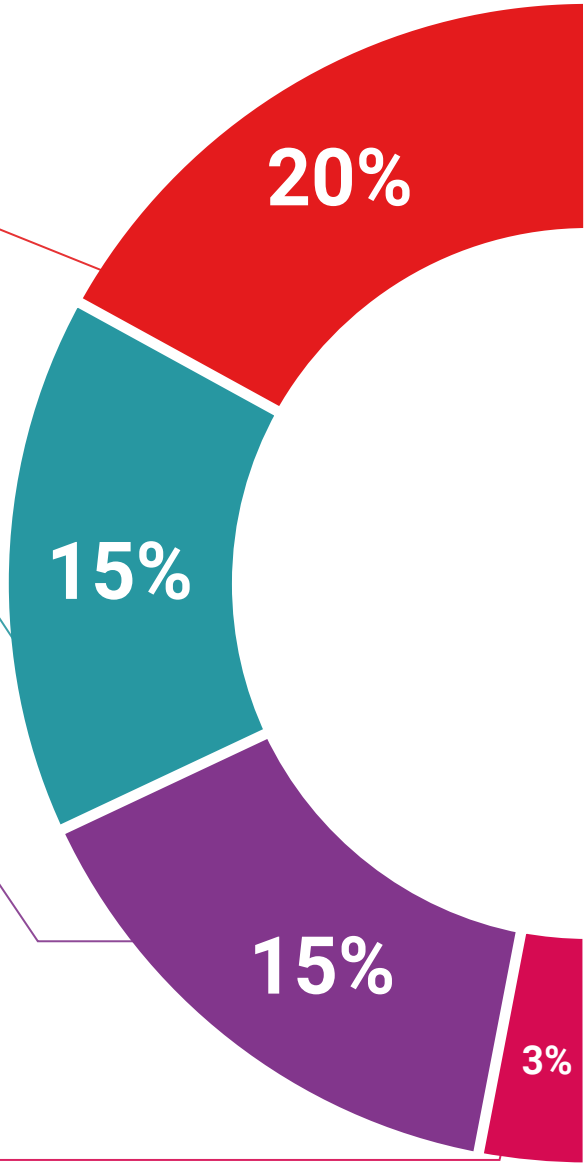
Interactive Summaries

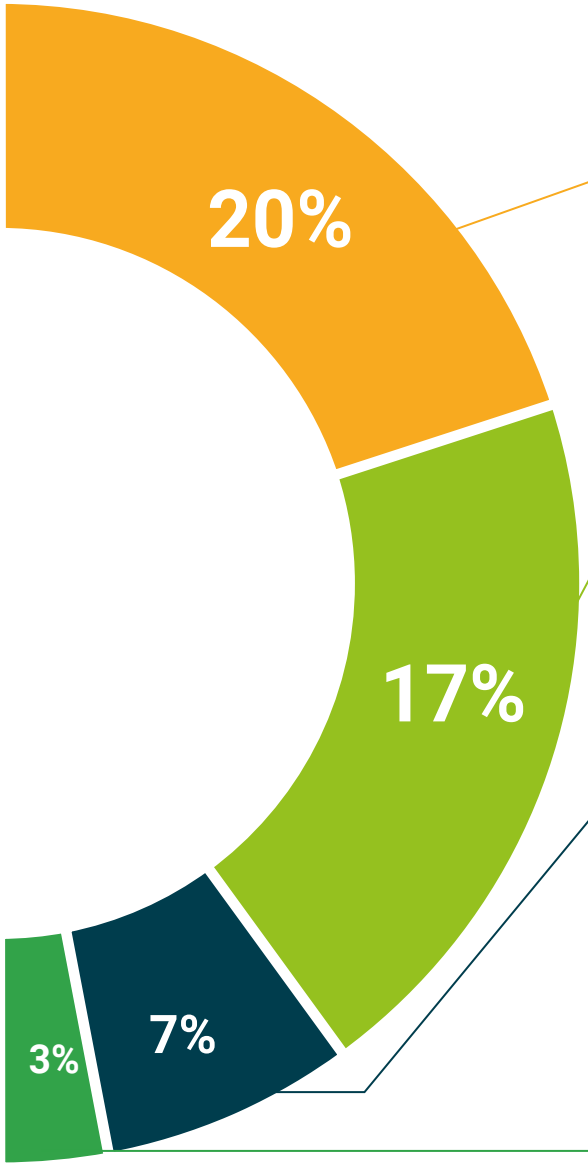
The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".

Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.





Expert-Led Case Studies and Case Analysis

Effective learning ought to be contextual. Therefore, TECH presents real cases in which the expert will guide students, focusing on and solving the different situations: a clear and direct way to achieve the highest degree of understanding.

Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.

Classes

There is scientific evidence suggesting that observing third-party experts can be useful.

Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

Quick Action Guides

TECH offers the most relevant contents of the course in the form of worksheets or quick action guides. A synthetic, practical, and effective way to help students progress in their learning.

07

Certificate

The Professional Master's Degree in Food Engineering Applied to Health guarantees, in addition to the most rigorous and up to date education, access to a Professional Master's Degree issued by TECH Global University.

Successfully complete this program and receive your university qualification without having to travel or fill out laborious paperwork"

This private qualification will allow you to obtain a **Professional Master's Degree in Food Engineering Applied to Health** endorsed by **TECH Global University**, the world's largest online university.

TECH Global University, is an official European University publicly recognized by the Government of Andorra ***(official bulletin)***. Andorra is part of the European Higher Education Area (EHEA) since 2003. The EHEA is an initiative promoted by the European Union that aims to organize the international training framework and harmonize the higher education systems of the member countries of this space. The project promotes common values, the implementation of collaborative tools and strengthening its quality assurance mechanisms to enhance collaboration and mobility among students, researchers and academics.

This **TECH Global University** private qualification, is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Professional Master's Degree in Food Engineering Applied to Health**

Modality: **online**

Duration: **12 months**

Accreditation: **60 ECTS**


tech global university

Mr./Ms. _____, with identification document _____
has successfully passed and obtained the title of:

Professional Master's Degree in Food Engineering Applied to Health

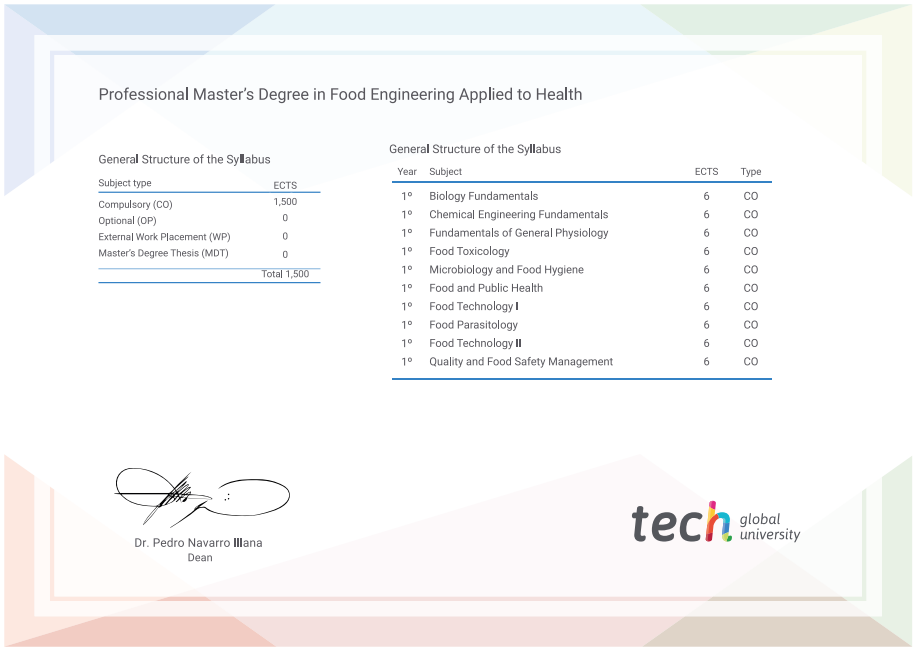
This is a private qualification of 1,800 hours of duration equivalent to 60 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH Global University is a university officially recognized by the Government of Andorra on the 31st of January of 2024, which belongs to the European Higher Education Area (EHEA).

In Andorra la Vella, on the 28th of February of 2024

Dr. Pedro Navarro Illana
Dean

This qualification must always be accompanied by the university degree issued by the competent authority to practice professionally in each country. Unique TECH Code: AFWORD23S techtitute.com/certificates


Professional Master's Degree in Food Engineering Applied to Health

General Structure of the Syllabus

Subject type	ECTS
Compulsory (CO)	1,500
Optional (OP)	0
External Work Placement (WP)	0
Master's Degree Thesis (MDT)	0
	Total 1,500

General Structure of the Syllabus

Year	Subject	ECTS	Type
1º	Biology Fundamentals	6	CO
1º	Chemical Engineering Fundamentals	6	CO
1º	Fundamentals of General Physiology	6	CO
1º	Food Toxicology	6	CO
1º	Microbiology and Food Hygiene	6	CO
1º	Food and Public Health	6	CO
1º	Food Technology I	6	CO
1º	Food Parasitology	6	CO
1º	Food Technology II	6	CO
1º	Quality and Food Safety Management	6	CO

Dr. Pedro Navarro Illana
Dean

tech global university

*Apostille Convention. In the event that the student wishes to have their paper diploma issued with an apostille, TECH Global University will make the necessary arrangements to obtain it, at an additional cost.

tech global university

Professional Master's Degree

Food Engineering Applied to Health

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Global University**
- Accreditation: **60 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Professional Master's Degree

Food Engineering Applied to Health

tech global university