

Hybrid Master's Degree

Comprehensive Risk
Analysis and Assessment
in the Food Industry





Hybrid Master's Degree

Comprehensive Risk
Analysis and Assessment
in the Food Industry

Modality: Hybrid (Online + Clinical Internship)

Duration: 12 months

Certificate: TECH Global University

Credits: 60 + 4 ECTS

Website: www.techtitude.com/us/nutrition/hybrid-master-degree/hybrid-master-degree-comprehensive-risk-analysis-assessment-food-industry

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01

Introduction

With the globalization of supply chains and the intensification of the effects of climate change, the risks associated with food production and distribution have become more complex and multifaceted. In fact, the emergence of new pathogens, antimicrobial resistance, and fluctuations in the availability of natural resources have increased the need for robust risk management systems. In this context, TECH has developed this program, divided into two distinct sections. The first, which covers the theoretical content entirely online, also incorporates the innovative Relearning methodology. The second section consists of a 3-week practical placement at a renowned institution in the field of the food industry.





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Thanks to this Hybrid Master's Degree, you will receive comprehensive and specialized training in the various aspects that impact food safety and quality in the contemporary world”

International regulations, such as those established by the World Health Organization (WHO) and the U.S. Food and Drug Administration (FDA), have emphasized the importance of implementing preventive and corrective measures based on thorough risk analyses in the food industry.

This is how this Hybrid Master's Degree was developed, which will provide a solid theoretical foundation in Microbiology, studying microorganisms relevant to food, and General Chemistry, offering the necessary background to understand interactions in food processes. Furthermore, the program will delve into the prevention and control of microbial contamination.

Additionally, it will explore how technological innovations and cultural practices influence food production and consumption, complementing this with an analysis of the biochemical composition of foods and their transformations during processing. Professionals will also examine the relationship between food and public health policies, addressing topics such as nutrition, disease prevention, and health promotion.

Finally, the program will emphasize the techniques necessary to assess and ensure the quality of food products, providing an overview of the structure and functioning of the industry and highlighting the importance of efficiency and sustainability. Tools will also be provided to identify, evaluate, and manage risks, focusing on the implementation of management systems that comply with international regulations and standards.

In this way, TECH has implemented a comprehensive program, with the theoretical part conducted entirely online and adaptable to students' work and personal schedules, requiring only an electronic device with internet access to access learning materials. Additionally, it is based on the revolutionary Relearning methodology, which consists of the repetition of key concepts for optimal and organic content absorption. On the other hand, it will include an intensive 3-week placement in a prestigious institution.

This **Hybrid Master's Degree in Comprehensive Risk Analysis and Assessment in the Food Industry** contains the most complete and up-to-date scientific program on the market. The most important features include:

- ♦ The development of over 100 practical case studies presented by experts from the food industry specializing in risk analysis and assessment, along with university professors with extensive experience in the field
- ♦ Their graphic, schematic and eminently practical contents provide essential information on those procedures that are indispensable for professional practice.
- ♦ All of this will be complemented by 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
- ♦ Furthermore, you will be able to carry out an internship in one of the best companies



You will deepen your understanding of the biochemical components of food and their chemical interactions, essential for understanding nutritional quality and safety. With all the guarantees of TECH quality!"

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You will undertake an intensive 3-week placement in a prestigious food company, gaining all the knowledge you need to grow both personally and professionally”

This Master's program, designed to be professionalizing and hybrid in format, is aimed at updating professionals in the food industry who work in companies within this field and require a high level of qualification. The content is based on the latest scientific evidence and is structured in a way that integrates theoretical knowledge with practical elements. This approach facilitates the updating of knowledge and enables informed decision-making in the management of food safety and quality.

Thanks to its multimedia content developed with the latest educational technology, the program offers a situated and contextual learning environment. It creates a simulated environment that provides immersive training, preparing professionals for real-world situations. The design of this program is based on Problem-Based Learning, by means of which the student must try to solve the different professional practice situations that arise during the program. For this purpose, students will be assisted by an innovative interactive video system created by renowned experts.

You will be trained to implement and manage quality and safety systems, ensuring that food products meet the highest standards and regulations. Enroll now!

Choose TECH! You will address the importance of controlling and preventing microbiological contamination in food products, laying the foundation for robust hygiene practices.



02

Why Study this Hybrid Master's Degree?

This program offers the perfect balance between theoretical and practical learning, allowing graduates to apply the knowledge acquired in real-world contexts within the food industry. Additionally, the program will address the latest trends and technologies in risk assessment, preparing professionals to face and manage both current and future challenges in food safety. Furthermore, the combination of modules, covering everything from microbiological and chemical fundamentals to quality management and control strategies, will ensure comprehensive and specialized training that is highly valued in the job market.



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You will examine policies and strategies to ensure public health through safe food, all thanks to cutting-edge educational materials and the latest technological advancements in teaching”

1. Update using the latest available technology

Advanced tools, such as Artificial Intelligence (AI) and Big Data analysis, enable the collection and processing of large volumes of data in real time, facilitating the identification of patterns and anomalies that could indicate potential risks. Additionally, IoT (Internet of Things) sensors integrated into production chains provide continuous and detailed monitoring, from ingredient quality to storage and transport conditions. Furthermore, Blockchain systems are enhancing traceability and transparency throughout the supply chain.

2. Learn from the best specialists

The extensive team of professionals who will guide the specialist throughout the practical period offers unmatched expertise and guarantees unprecedented updates in the field. With a designated tutor, students will develop real projects in a cutting-edge environment, allowing them to incorporate the most effective procedures and tools into their daily practice of Comprehensive Risk Analysis and Assessment in the Food Industry.

3. Train in top-tier professional environments

TECH carefully selects every center available for Internship Programs. As a result, specialists will be guaranteed access to prestigious environments within the food industry. They will experience the daily demands of a rigorous, exhaustive work area, always applying the most innovative techniques in their work methodology.





4. Combine the best theory with advanced practical training

The academic market is full of educational programs poorly adapted to the daily realities of specialists, often requiring long hours of coursework that are not compatible with personal and professional life. TECH offers a new learning model, 100% practical, enabling specialists to lead cutting-edge procedures in the food industry and, best of all, apply them professionally in just 3 weeks.

5. Open the door to new opportunities

Given the increasing focus on sustainability and public health, the demand for experts capable of implementing innovative and sustainable practices in food production has risen.

This not only improves safety and efficiency but also opens pathways to strategic roles in consulting, regulatory bodies, and leading food technology companies. As such, by acquiring advanced skills and specialized knowledge, professionals not only strengthen their career profiles but also make a significant contribution to public health protection.



*You will have full practical immersion
at the center of your choice*

03 Objectives

The university program aims to understand the microbiological and chemical foundations that affect food safety, as well as the advanced technologies used in the industry. Another key objective is to develop practical skills in quality analysis and control, including the implementation of food safety management systems based on international standards. Moreover, it will encourage a comprehensive perspective that incorporates cultural, technological, and public health aspects, preparing professionals to address complex and dynamic challenges in a global environment.





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The objectives of this Hybrid Master's Degree are focused on preparing highly qualified professionals to identify, evaluate, and manage risks associated with the production and distribution of food”



General Objective

- The general objective of the Hybrid Master's Degree in Comprehensive Risk Analysis and Assessment in the Food Industry will be the acquisition of fundamental knowledge in epidemiology and prophylaxis, essential for understanding and preventing the spread of diseases through food. It will also focus on learning the physicochemical parameters that affect microbial growth in food, enabling graduates to understand and control factors that could compromise food safety. Additionally, they will be able to identify and distinguish the differential nature of acellular organisms, such as viruses, viroids, and prions, in terms of their structure and replication processes



You will master advanced techniques to assess and ensure quality at all stages of the food chain, utilizing the extensive multimedia resource library offered by TECH





- ◆ Recognize the levels of organization of prokaryotic and eukaryotic microorganisms, as well as to relate their main structures to their function
- ◆ Understand the basis of microbial pathogenicity and the defense mechanisms of the human body against existing pathogens
- ◆ Point out the main techniques and strategies for the inhibition, destruction or elimination of microbial populations
- ◆ Understand and interrelate the main mechanisms of genetic exchange in microorganisms and their application in food biotechnology

- ◆ Explain in an understandable way basic chemical phenomena and processes that interact with the environment
- ◆ Describe the structure, physicochemical properties and reactivity of elements and compounds involved in biogeochemical cycles
- ◆ Operate basic instrumentation in a chemistry laboratory
- ◆ Have the ability to interpret the results in the practical environment of chemistry

Module 3. Microbiology and Food Hygiene

- ♦ Gain knowledge about the main transformative, pathogenic and beneficial microorganisms in food
- ♦ Learn about the mechanisms of food preservation and know how to prevent microbial spoilage of food
- ♦ Understand how to identify and differentiate the main elements causing foodborne pathologies: microorganisms, toxins, viruses and parasites
- ♦ Learn about the beneficial effects of microorganisms in the field of food
- ♦ Identify and understand the most important elements of a microbiology laboratory
- ♦ Evaluate the beneficial effects of microorganisms in foods
- ♦ Learn and apply techniques for the detection of microorganisms in food

Module 4. Food, Technologies and Culture

- ♦ Analyze the historical-cultural evolution of the transformation and consumption of food or specific food groups
- ♦ Relate the progress in scientific and technical knowledge of food with the cultural and technological progress
- ♦ Identify factors that influence the choice and acceptability of foods
- ♦ Recognize the role of cultural norms in food customs and regulations, as well as in the role of food in society
- ♦ Distinguish the essential characteristics of food and its branches in the context of today's food industry
- ♦ Analyze trends in food production and consumption

Module 5. Biochemistry and Food Chemistry

- ♦ Learn, understand and use the principles of chemical and biochemical reactions of foods in an appropriate professional context
- ♦ Identify and use the principles of food components and their physicochemical, nutritional, functional and sensory properties
- ♦ Acquire skills and abilities in food analysis
- ♦ Ability to identify the problems associated with different foods and their processing, the different technological processes together with the transformations that the products may undergo during these processes

Module 6. Food and Public Health

- ♦ Learn about the distinguishing fact of human nutrition, interrelationships between nature and culture
- ♦ Acquire a good understanding of individual and social eating behaviors
- ♦ Get to 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
- ♦ 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. Analysis and Quality Control

- ♦ Recognize food components and their physicochemical, nutritional, functional and sensory properties
- ♦ Acquire and apply skills and abilities in food analysis during professional practice
- ♦ Develop and apply quality control and traceability mechanisms in the food chain
- ♦ Design and develop experimental tests to evaluate food and food processes
- ♦ Understand the bases and principles of the methods used for quality control and food authenticity

Module 8. The Food Industry

- ♦ Control and optimize processes and products in the food industry Manufacture and preserve foodstuffs
- ♦ Develop new processes and products
- ♦ Understand the industrial processes of food processing and preservation, as well as packaging and storage technologies
- ♦ Discover the transformation and preservation processes particular to the main types of food industries
- ♦ Identify the process and product control and optimization systems applied to the main types of food industries
- ♦ Apply the knowledge of transformation and preservation processes to the development of new processes and products

Module 9. Risk Analysis in the Food Industry

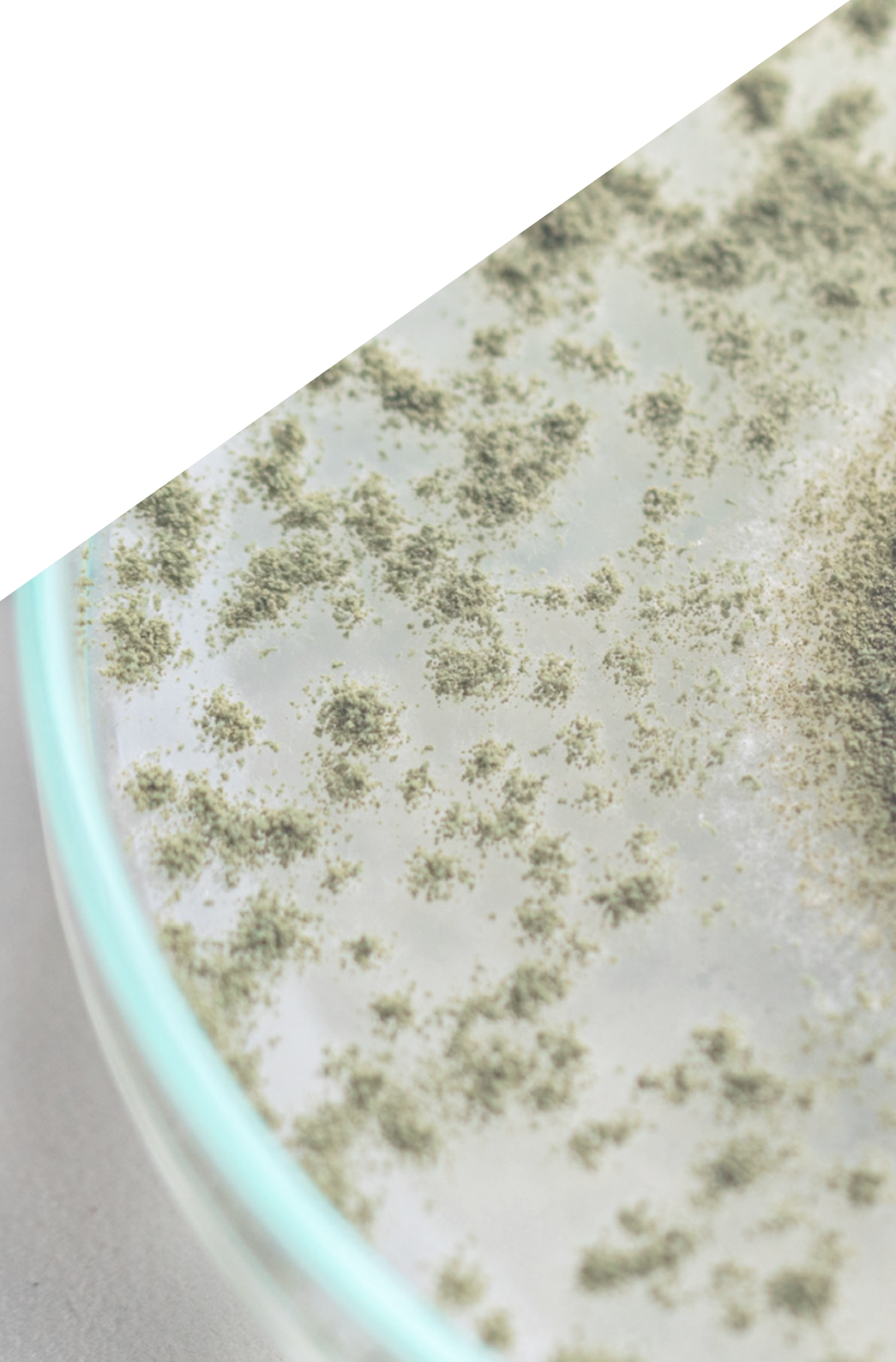
- ♦ Knowing the factors that influence microbial growth in different foods for human consumption
- ♦ Identify, analyze and evaluate the biological, chemical and physical hazards that can occur during all stages of the food chain
- ♦ Identify the main microorganisms and parasites responsible for foodborne diseases
- ♦ Understand and recognize the public health significance of foodborne diseases and the control measures applicable in each case
- ♦ Understand how to apply available web resources to search for information related to food safety management and assessment

Module 10. Quality and Food Safety Management

- ♦ 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
- ♦ Contribute towards consumer protection within the framework of food safety and quality

04 Skills

The Hybrid Master's Degree in Comprehensive Risk Analysis and Assessment in the Food Industry will develop crucial competencies for professionals in this dynamic and essential field. Graduates will acquire advanced skills in identifying and evaluating microbiological, chemical, and physical risks in the food chain, as well as applying analytical methods and innovative technologies to mitigate them. Additionally, they will strengthen their ability to implement and manage food quality and safety systems, ensuring compliance with international standards and safeguarding public health.



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You will lead research projects, develop preventive strategies, and respond to food emergencies, contributing to the improvement of food safety and quality”



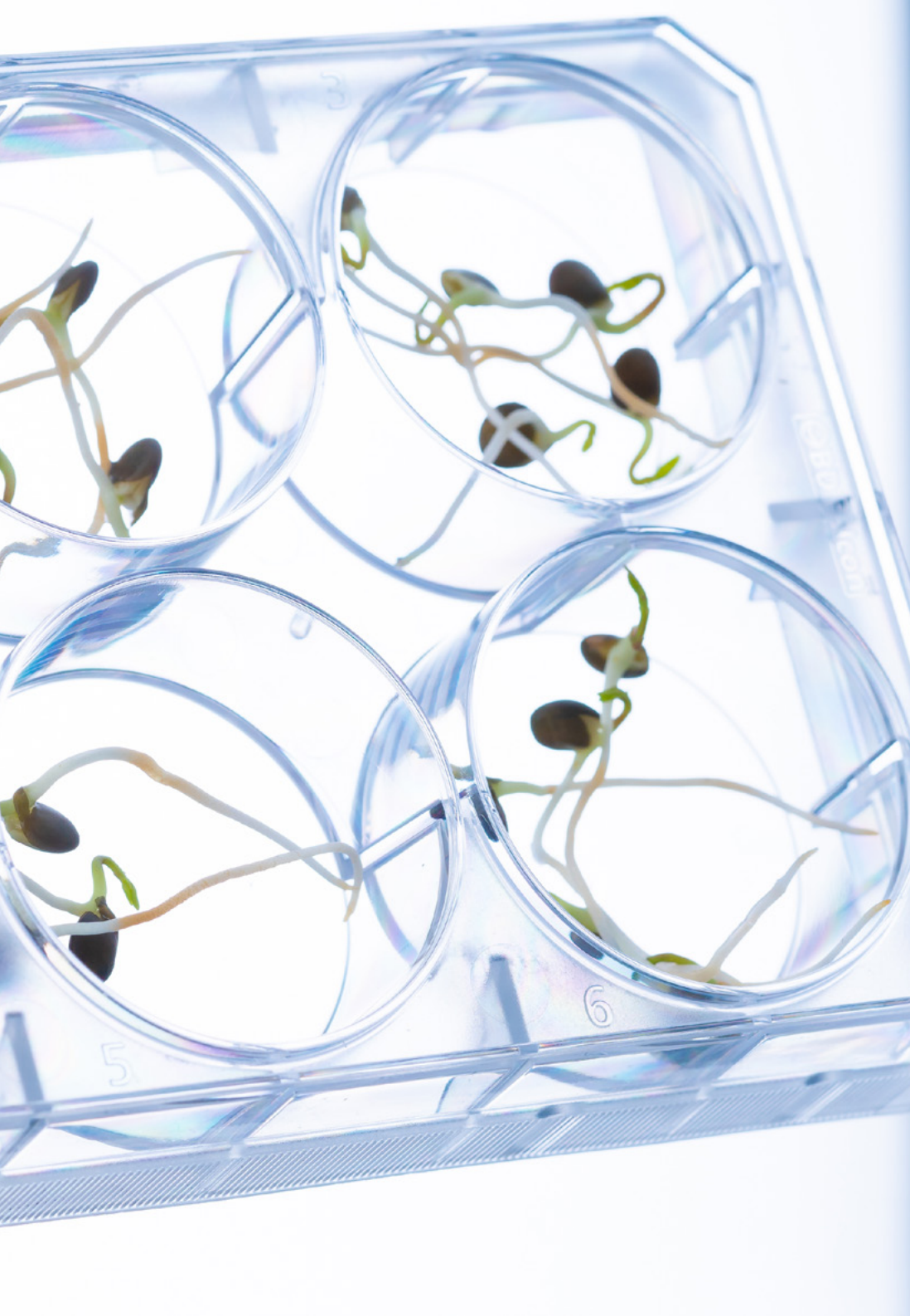
General Skills

- Understand the mechanisms and parameters for controlling processes and equipment in the food industry
- Manage and assess food safety by identifying hazards, evaluating risks, and implementing effective control measures throughout the food chain to prevent, eliminate, or reduce hazards associated with food consumption
- Acquire and handle the appropriate scientific terminology
- Recognize the different types of microbial metabolism and their nutritional requirements, linking this knowledge to their development in various food types

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You will be trained in identifying and evaluating potential risks, using modern methodologies and tools, alongside the best digital university in the world, according to Forbes: TECH”





Specific Skills

- ♦ Design and evaluate tools that promote food safety management throughout the food chain to protect public health
- ♦ Plan and develop sampling plans for food analysis and to know the procedure to establish food safety objectives
- ♦ Identify the concepts of public health and risk prevention related to food consumption habits and food safety.
- ♦ Collect and interpret relevant data on the biochemical reactions of food to make judgments that include a reflection on its organoleptic quality, shelf life and associated risks that it presents
- ♦ Know how to convey information, ideas, problems and solutions to both specialized and non-specialized audiences
- ♦ Acquire the basic skills to handle and analyze microorganisms, following the guidelines of good laboratory practices

05

Structure and Content

From the fundamentals of Microbiology and Chemistry applied to food, to the detailed study of the risks associated with the production, distribution, and consumption of food products, this program will include specific modules on emerging technologies and advanced methods for quality analysis and control. Additionally, it will delve into crucial topics such as food crisis management, international legislation and regulations, as well as strategies to optimize food safety and traceability in the supply chain.



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The Hybrid Master's Degree in Comprehensive Risk Analysis and Assessment in the Food Industry will cover specialized content, designed to provide comprehensive and up-to-date training in the sector”

Module 1. Fundamentals of Microbiology

- 1.1. Introduction to Microbiology
 - 1.1.1. Concept of Microbiology and Historical Aspects
 - 1.1.2. Prokaryotic Cell Model
 - 1.1.2.1. Morphology
 - 1.1.2.2. Structure and Function
 - 1.1.3. Relevance of Microorganisms in Society
- 1.2. Observation of Microorganisms. Microscopy and Staining
 - 1.2.1. Basic Concepts of Microscopy
 - 1.2.2. Types of Microscopes: Structure and Function
 - 1.2.2.1. Optical Microscope
 - 1.2.2.2. Electronic Microscope
 - 1.2.2.3. Fluorescence Microscope
 - 1.2.3. Types of Staining Most Commonly Used in Microbiology
 - 1.2.3.1. Grams Stain
 - 1.2.3.2. Endospore Staining
 - 1.2.3.3. Acid Fast Bacillus Alcohol Resistant (BAR) staining
- 1.3. Microbial Growth and control
 - 1.3.1. Types of Metabolism in Prokaryotes
 - 1.3.2. Bacterial Growth Curve
 - 1.3.3. Isolation and Conservation Techniques of Microorganisms
 - 1.3.4. Factors Affecting Microbial Growth
 - 1.3.4.1. Bacteriostatic and Bactericidal Agents
 - 1.3.4.2. Environmental Agents
- 1.4. Bacterial Genetics and Taxonomy
 - 1.4.1. Mechanisms of Genetic Exchange
 - 1.4.1.1. Transformation
 - 1.4.1.2. Conjugation
 - 1.4.1.3. Transduction and Bacteriophages
 - 1.4.2. Mutations in the Bacterial Genome
 - 1.4.3. Basic concepts of Systematics and Classification
 - 1.4.4. Bacterial Classification Methods
- 1.5. Pathogenesis of Microorganisms and Microbiota
 - 1.5.1. Microbiota and its Importance
 - 1.5.2. Mechanisms of Pathogenesis
 - 1.5.2.1. Virulence Factors: Capsule and Lipopolysaccharide
 - 1.5.2.2. Routes of Dissemination of Microorganisms
 - 1.5.3. Toxi-infections and food poisoning
 - 1.5.4. Microbial Foodborne Diseases
- 1.6. Virus
 - 1.6.1. General Characteristics: Structure and Composition
 - 1.6.2. Classification of viruses
 - 1.6.3. Life Cycles in Viruses and Crops
 - 1.6.4. Mechanisms of Pathogenesis associated with viruses in foodstuffs
 - 1.6.5. Types of Antivirals
- 1.7. Fungi
 - 1.7.1. General Characteristics: Structure and Composition
 - 1.7.2. Classification of Fungi
 - 1.7.2.1. Ascomycetes
 - 1.7.2.2. Deuteromycetes
 - 1.7.2.3. Basidiomycetes
 - 1.7.2.4. Zygomycetes
 - 1.7.3. Mechanisms of Pathogenesis associated with Fungi in foodstuffs
 - 1.7.3.1. Types of Mycotoxins
 - 1.7.4. Types of Antifungals
- 1.8. Microbiological Immunology: Antigens and Antibodies
 - 1.8.1. Background of Immunology
 - 1.8.2. Types of Immunological Response
 - 1.8.2.1. Innate Response
 - 1.8.2.2. Adaptive Response
 - 1.8.2.3. Regulation of the Immune System
 - 1.8.3. Antibodies Structure and Function
 - 1.8.4. Immune System Evasion Methods

- 1.9. Epidemiology and Prophylaxis
 - 1.9.1. Background in Epidemiology
 - 1.9.2. Epidemiological Chain and Concept of Health
 - 1.9.3. Epidemiology and Preventive Measures for Infectious Diseases in Food
 - 1.9.4. Food as a Route of Disease Transmission
- 1.10. Main Microorganisms of Food Interest
 - 1.10.1. Development of Microorganisms in Food
 - 1.10.2. Types of Food Microorganism
 - 1.10.2.1. Altering Microbes
 - 1.10.2.2. Pathogenic Microbes
 - 1.10.2.3. Beneficial Microbes
 - 1.10.3. Foodborne Diseases

Module 2. General Chemistry

- 2.1. Matter Structure and Chemical Bonding
 - 2.1.1. Matter
 - 2.1.2. The Atom
 - 2.1.3. Types of Chemical Bonds
- 2.2. Gases, Liquids and Solutions
 - 2.2.1. Gases
 - 2.2.2. Liquids
 - 2.2.3. Types of Solutions
- 2.3. Thermodynamics
 - 2.3.1. Introduction to Thermodynamics
 - 2.3.2. First Principle of Thermodynamics
 - 2.3.3. Second Principle of Thermodynamics
- 2.4. Acid-Base
 - 2.4.1. Concepts of Acidity and Basicity
 - 2.4.2. pH
 - 2.4.3. pOH
- 2.5. Solubility and Precipitation
 - 2.5.1. Solubility Equilibrium
 - 2.5.2. Floccules
 - 2.5.3. Colloids
- 2.6. Oxidation-Reduction Reactions
 - 2.6.1. Redox Potential
 - 2.6.2. Introduction to Batteries
 - 2.6.3. Electrolytic Tank
- 2.7. Carbon Chemistry
 - 2.7.1. Introduction
 - 2.7.2. Carbon Cycle
 - 2.7.3. Organic Formulation
- 2.8. Energy and Environment
 - 2.8.1. Battery Continuation
 - 2.8.2. Carnot Cycle
 - 2.8.3. Diesel Cycle
- 2.9. Atmospheric Chemistry
 - 2.9.1. Main Atmospheric Pollutants
 - 2.9.2. Acid Rain
 - 2.9.3. Transboundary Pollution
- 2.10. Soil and Water Chemistry
 - 2.10.1. Introduction
 - 2.10.2. Water Chemistry
 - 2.10.3. Soil Chemistry

Module 3. Microbiology and Food Hygiene

- 3.1. Introduction to Food Microbiology
 - 3.1.1. History of Food Microbiology
 - 3.1.2. Microbial Diversity: Archaea and Bacteria
 - 3.1.3. Phylogenetic Relationships Among Living Organisms
 - 3.1.4. Microbial Classification and Nomenclature
 - 3.1.5. Eukaryotic Microorganisms: Algae, Fungi and Protozoa
 - 3.1.6. Virus
- 3.2. Introduction to Food Microbiology
 - 3.2.1. Sterilization and Asepsis Methods
 - 3.2.2. Culture Mediums: Liquid and Solid, Synthetic or Defined, Complex, Differential and Selective
 - 3.2.3. Isolation of Pure Cultures
 - 3.2.4. Microbial Growth in Discontinuous and Continuous Cultures
 - 3.2.5. Influence of Environmental Factors on Growth
 - 3.2.6. Optical Microscopy
 - 3.2.7. Sample Preparation and Staining
 - 3.2.8. Fluorescence Microscope
 - 3.2.9. Transmission and Scanning Electron Microscopy
- 3.3. Microbial Metabolism
 - 3.3.1. Ways of Obtaining Energy
 - 3.3.2. Phototrophic, Chemolithotrophic and Chemorganotrophic microorganisms
 - 3.3.3. Carbohydrate Catabolism
 - 3.3.4. Degradation of Glucose to Pyruvate (Glycolysis, Pentose Phosphate Pathway and Entner-Doudoroff Pathway)
 - 3.3.5. Lipid and Protein Catabolism
 - 3.3.6. Fermentation
 - 3.3.7. Types of Fermentation
 - 3.3.8. Respiratory Metabolism: Aerobic Respiration and Anaerobic Respiration
- 3.4. Microbial Food Alterations
 - 3.4.1. Microbial Ecology of Foods
 - 3.4.2. Sources of Contamination of Vegetable Foods
 - 3.4.3. Fecal Contamination and Cross Contamination
 - 3.4.4. Factors Influencing Microbial Alteration
 - 3.4.5. Microbial Metabolism in Food
 - 3.4.6. Alteration Control and Preservation Methods
- 3.5. Foodborne Diseases of Microbial Origin
 - 3.5.1. Foodborne Infections: Transmission and Epidemiology
 - 3.5.2. Salmonellosis
 - 3.5.3. Typhoid and Paratyphoid Fever
 - 3.5.4. *Campylobacter* Enteritis
 - 3.5.5. Bacillary Dysentery
 - 3.5.6. Diarrhea Caused by Virulent *E. coli* Strains
 - 3.5.7. Yersiniosis
 - 3.5.8. Vibrio Infections
- 3.6. Diseases Caused by Foodborne Protozoa and Helminths
 - 3.6.1. General Characteristics of Protozoa
 - 3.6.2. Amoebic Dysentery
 - 3.6.3. Giardiasis
 - 3.6.4. Toxoplasmosis
 - 3.6.5. Cryptosporidiosis
 - 3.6.6. Microsporidiosis
 - 3.6.7. Food-borne Helminths: Flatworms and Roundworms
- 3.7. Viruses, Prions and Other Foodborne Biohazards
 - 3.7.1. General Properties of Viruses
 - 3.7.2. Composition and Structure of the Virion: Capsid and Nucleic Acid
 - 3.7.3. Virus Growth and Cultivation
 - 3.7.4. Virus Life Cycle (Lytic Cycle): Phases of Adsorption, Penetration, Gene Expression and Replication, and Release
 - 3.7.5. Alternatives to the Lytic Cycle: Lysogeny in Bacteriophages, Latent Infections, Persistent Infections and Tumor Transformation in Animal Viruses

- 3.7.6. Viroids, Virusoids and Prions
- 3.7.7. Incidence of Foodborne Viruses
- 3.7.8. Characteristics of Foodborne Viruses
- 3.7.9. Hepatitis A
- 3.7.10. Rotavirus
- 3.7.11. Scombroid Poisoning
- 3.8. Microbiological Analysis of Food
 - 3.8.1. Sampling and Sampling Techniques
 - 3.8.2. Reference Values
 - 3.8.3. Indicator Microorganisms
 - 3.8.4. Microbiological Counts
 - 3.8.5. Determination of Pathogenic Microorganisms
 - 3.8.6. Rapid Detection Techniques in Food Microbiology
 - 3.8.7. Molecular Techniques: Conventional PCR and real-time PCR
 - 3.8.8. Immunological Techniques
- 3.9. Beneficial Microorganisms in Food
 - 3.9.1. Food Fermentation: The Role of Microorganisms in the Production of Foodstuffs
 - 3.9.2. Microorganisms as Food Supplements
 - 3.9.3. Natural Preservatives
 - 3.9.4. Biological Systems of Food Conservation
 - 3.9.5. Probiotic Bacteria
- 3.10. Microbial Cell biological
 - 3.10.1. General Characteristics of Eukaryotic and Prokaryotic Cells
 - 3.10.2. The Prokaryotic Cell: Components Outside the Cell Wall: Glycocalyx and S-layer, Cell Wall, Plasma Membrane
 - 3.10.3. Flagella, Bacterial Mobility and Taxia
 - 3.10.4. Other Surface Structures, Fimbriae and Pilli

Module 4. Food, Technologies and Culture

- 4.1. Introduction to Food Culture
 - 4.1.1. Food and Nutrition: Man as an Omnivorous Animal
 - 4.1.2. Concept of Culture and Eating Behavior
 - 4.1.3. Human Nutrition in Different Types of Societies
 - 4.1.4. Concept of Dietary Adaptation: Examples of Dietary Adaptation
- 4.2. Factors that Influence Diet
 - 4.2.1. Ideological Meaning of Food
 - 4.2.2. Diet and Gender
 - 4.2.3. Patterns of Eating in Different Cultures: Production, Consumption and Behavior
- 4.3. Religion and Food
 - 4.3.1. Permitted and Prohibited Foods
 - 4.3.2. Relationship Between Food and Religious Rituals
 - 4.3.3. Religion-Related Dietary Practices and Behaviors
- 4.4. Historical Basis of Food
 - 4.4.1. Major Changes in Human Nutrition at Different Stages of History
 - 4.4.2. Prehistory
 - 4.4.3. The Ancient Age
 - 4.4.4. Middle Ages
 - 4.4.5. Impact of the Discovery of America on European Food and The New World
 - 4.4.6. The Modern Age
- 4.5. Scientific Advances and Food
 - 4.5.1. The Industrial Revolution
 - 4.5.2. Impact of Scientific Discoveries and Technological Development in the Food Industry
- 4.6. Contemporary Food I
 - 4.6.1. Socio-economic and Demographic Factors that Condition the Current Diet
 - 4.6.2. Food and Immigration
 - 4.6.3. Man and Abundance in the World, Myths and Facts

- 4.7. Contemporary Food II
 - 4.7.1. New Food Trends
 - 4.7.2. Rise of Mass Catering and Fast Food
 - 4.7.3. Interest in Diet and Health
- 4.8. Food Acceptability
 - 4.8.1. Physiological and Psychological Conditions
 - 4.8.2. Food Quality Concept
 - 4.8.3. Evaluation of Food Acceptability
- 4.9. Communication Techniques
 - 4.9.1. Food Marketing
 - 4.9.2. Marketing Elements
 - 4.9.3. Food Advertising Resources
 - 4.9.4. Influence of Advertising on Eating Behavior
- 4.10. Socio-cultural Factors of Feeding
 - 4.10.1. Social Relations
 - 4.10.2. Expression of Feelings, Prestige and Power
 - 4.10.3. Neolithic and Paleolithic Social Groups

Module 5. Biochemistry and Food Chemistry

- 5.1. Water in Food
 - 5.1.1. Importance of Water in Foods
 - 5.1.1.1. Molecular Structure and Physicochemical Properties
 - 5.1.1.2. Concept of Water Activity
 - 5.1.2. Methods for Determining Water Activity
 - 5.1.3. Sorption Isotherms
 - 5.1.4. Molecular Mobility of Water
 - 5.1.5. State Diagrams: Phase Transition in Foodstuffs
 - 5.1.6. Technological Importance of Water in Industrial Processes
- 5.2. Functional Properties of Carbohydrates
 - 5.2.1. Characteristics of Carbohydrates in Foods
 - 5.2.2. Functional Properties of Mono- and Oligosaccharides
 - 5.2.3. Structure and Properties of Polysaccharides
 - 5.2.3.1. Formation and Stability of Starch Gels
 - 5.2.3.2. Factors Influencing the Formation of Starch Gels





- 5.3. Structural Polysaccharides and Their Functions in Foodstuffs
 - 5.3.1. Pectins, Cellulose, and Other Cell Wall Components
 - 5.3.2. Polysaccharides from Marine Algae
- 5.4. Non-Enzymatic and Enzymatic Browning
 - 5.4.1. General Characteristics of Non-Enzymatic Browning
 - 5.4.2. Non-Enzymatic Browning Reactions
 - 5.4.3. Caramelization and Maillard Reaction
 - 5.4.4. Mechanisms and Control of Non-Enzymatic Browning
 - 5.4.5. Enzymatic Browning Reactions and Measures to Control It
- 5.5. Carbohydrates in Fruits and Vegetables
 - 5.5.1. Metabolism of Fruits and Vegetables
 - 5.5.2. Biochemical Reactions of Carbohydrates in Fruits and Vegetables
 - 5.5.3. Control of Post-Harvest Conditions: Post-Harvest Treatment
- 5.6. Functional Properties of Lipids
 - 5.6.1. Characteristics of Food Lipids
 - 5.6.2. Functional Properties of Lipids: Formation of Crystals and Melting
 - 5.6.3. Formation and Breaking of Emulsions
 - 5.6.4. Functions of Emulsifiers and HLB Value
- 5.7. Lipid Modifications in Foods
 - 5.7.1. Main Lipid Modification Reactions
 - 5.7.1.1. Lipolysis
 - 5.7.1.2. Autooxidation
 - 5.7.1.3. Enzymatic Rancidity
 - 5.7.1.4. Chemical Modifications of Frying
 - 5.7.2. Physicochemical Treatments of Lipid Modification
 - 5.7.2.1. Hydrogenation
 - 5.7.2.2. Transesterification
 - 5.7.2.3. Fractionation
- 5.8. Functional Properties of Proteins and Enzymes in Food
 - 5.8.1. Amino Acid Characteristics and Protein Structure in Foodstuffs
 - 5.8.2. Types of Bonds in Proteins: Functional Properties
 - 5.8.3. Effect of Treatments on Protein Systems in Breads, Meats, and Milk
 - 5.8.4. Types of Food Enzymes and Applications
 - 5.8.5. Immobilized Enzymes and Their Use in the Food Industry

- 5.9. Pigments Present in Food
 - 5.9.1. General Characteristics in Food
 - 5.9.2. Chemistry and Biochemistry of Myoglobin and Hemoglobin
 - 5.9.3. Effect of Storage Processing on Meat Color
 - 5.9.4. Effect of Processing on Chlorophylls
 - 5.9.5. Structure of Carotenoids and Anthocyanins
 - 5.9.6. Color Modifications in Anthocyanins and Chemical Reactions Involving Them
 - 5.9.7. Flavonoids
- 5.10. General Aspects of Food Additives
 - 5.10.1. General Concept of Food Additives
 - 5.10.2. Criteria for the Use of Additives: Labeling of Additives
 - 5.10.3. Shelf-Life Extending Additives
 - 5.10.3.1. Preservatives: Sulfites and Derivatives, Nitrites, Organic Acids and Derivatives, and Antibiotics
 - 5.10.4. Antioxidants and Their Characteristics
 - 5.10.5. Additives That Improve Texture: Thickeners, Gelling Agents, and Stabilizers Anti-Caking Agents. Flour Treatment Agents

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 Making
 - 6.1.2. The Use of Fire, Hunter-Gatherer Profiles. Butcher 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 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. Laws of Public Health
 - 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 Factors in 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. Toxins of Natural Origin in Food
 - 6.10.2. Toxins due to Incorrect Handling
 - 6.10.3. Use of Food Additives

Module 7. Analysis and Quality Control

- 7.1. Introduction to Food Analysis and Control
 - 7.1.1. Food Quality. Concept of Quality and Its Evaluation
 - 7.1.2. Main Quality Attributes of Foods
 - 7.1.3. Quality Standards
 - 7.1.4. Food Quality Alterations
 - 7.1.4.1. Physical Alterations
 - 7.1.4.2. Chemical Alterations
 - 7.1.4.3. Biological Alterations
 - 7.1.5. Fraud and Adulteration

- 7.2. Quality Control Techniques I
 - 7.2.1. Food Quality Control. Concept. Traceability in Quality Control
 - 7.2.2. Quality Management, Control, and Assurance Systems
 - 7.2.3. Statistical Methods Applied to Quality Control
 - 7.2.4. Acceptance Control at Reception. Statistical Process Control
- 7.3. Techniques in Quality Control II
 - 7.3.1. Charts for Quality Control by Variables and Attributes
 - 7.3.2. Final Product Quality Assurance
 - 7.3.3. Bases and Principles of Methods Used for Quality Control and Authenticity of Foods
 - 7.3.4. Molecular Biology and Immunological Techniques
 - 7.3.5. Compositional Analysis. Sensory Analysis of Foods
- 7.4. Evaluation of Food Quality I
 - 7.4.1. Water Content in Foods. Importance of Water in Foods
 - 7.4.1.1. Analytical Methods for Determining Water Content
 - 7.4.1.2. Concept of Water Activity and Its Importance in Foods
 - 7.4.1.3. Analytical Methods for Determining Water Activity
 - 7.4.2. Carbohydrate Content in Foods. Carbohydrates in Foods
 - 7.4.2.1. Importance of Carbohydrates in Foods
 - 7.4.2.2. Analytical Methods for Determining Carbohydrates
 - 7.4.3. Content of Nitrogen Compounds in Foods. Nitrogen compounds in foods
 - 7.4.3.1. Importance of Nitrogen Components in Foods
 - 7.4.3.2. Analytical Methods for Determining Nitrogen Compounds
 - 7.4.4. Content of Lipid Compounds in Foods. Lipid Compounds in Foods
 - 7.4.4.1. Importance of Lipids in Foods
 - 7.4.4.2. Analytical Methods for Determining Lipid Compounds

- 7.5. Evaluation of Food Quality II
 - 7.5.1. Vitamin Content in Foods. Vitamins in Foods
 - 7.5.1.1. Importance of Vitamins in Foods
 - 7.5.1.2. Analytical Methods for Determining Vitamins
 - 7.5.2. Mineral Content in Foods. Minerals in Foods
 - 7.5.2.1. Importance of Minerals in Foods
 - 7.5.2.2. Analytical Methods for Determining Minerals
 - 7.5.3. Other Components in Foods
 - 7.5.3.1. Phytochemicals in Foods
 - 7.5.3.2. Analytical Methods for Determining Phytochemicals
 - 7.5.4. Food Additives. Additives in the Agri-Food Industry
 - 7.5.4.1. Importance of Additives
 - 7.5.4.2. Analytical Methods for Determining Additives
- 7.6. Evaluation of Meat and Meat Products Quality
 - 7.6.1. Determination of pH and CRA in Fresh Meat PSE or DFD Meat
 - 7.6.2. Determination of Collagen in Meat Products
 - 7.6.3. Determination of Starch in Cooked Meat Products
- 7.7. Evaluation of Fish, Seafood, and Derivatives Quality
 - 7.7.1. Determination of Freshness in Fish and Seafood
 - 7.7.1.1. Determination of Color, Flavor, and Texture
 - 7.7.1.2. Determination of Anisakis in Fish
 - 7.7.1.2.1. Determination of Fish Species
- 7.8. Evaluation of Milk and Dairy Products Quality
 - 7.8.1. Total Solids
 - 7.8.2. Alcohol Stability
 - 7.8.3. Butter Quality: Refractive Index of Fat
- 7.9. Evaluation of Cereal, Legumes, and Derivatives Quality
 - 7.9.1. Determination of Transgenic Corn Presence
 - 7.9.2. Determination of Soft Wheat Presence in Semolina
 - 7.9.3. Quality Control in Legumes
- 7.10. Evaluation of Fruits, Vegetables, and Derivatives Quality
 - 7.10.1. Control of Categorization of Fruits and Vegetables
 - 7.10.2. Quality Control of Canned Fruits and Vegetables
 - 7.10.3. Quality Control of Frozen Fruits and Vegetables

Module 8. Food Industry

- 8.1. Cereals and By-Products I
 - 8.1.1. Cereals: Production and Consumption
 - 8.1.1.1. Cereal Classification
 - 8.1.1.2. Current State of Research and Industry Situation
 - 8.1.2. Basic Concepts of Cereal Grains
 - 8.1.2.1. Methods and Equipment for the Characterization of Flours and Bread Doughs
 - 8.1.2.2. Rheological Properties During Kneading, Proofing and Baking
 - 8.1.3. Cereal Products: Ingredients, Additives and Adjuvants. Classification and Effects
- 8.2. Cereals and By-Products II
 - 8.2.1. Baking Process: Stages, Changes Produced and Equipment Used
 - 8.2.2. Instrumental, sensory and nutritional characterization of cereal-derived products
 - 8.2.3. Application of Cold in Bakery. Frozen Pre-Baked Breads. Process and Product Quality
 - 8.2.4. Gluten-Free Products Derived From Cereals. Formulation, process and quality characteristics
 - 8.2.5. Food Pastas. Ingredients and Process. Types of Pasta
 - 8.2.6. Innovation in Bakery Products. Trends in Product Design
- 8.3. Milk and Dairy Products. Eggs and Egg Products I
 - 8.3.1. Hygienic-Sanitary Milk Quality
 - 8.3.1.1. Origin and Levels of Contamination. Initial and Contaminating Microbiota
 - 8.3.1.2. Presence of Chemical Contaminants: Residues and Pollutants
 - 8.3.1.3. Influence of hygiene in the milk production and marketing chain
 - 8.3.2. Milk Production. Milk Synthesis
 - 8.3.2.1. Factors influencing the Composition of the milk Extrinsic and Intrinsic
 - 8.3.2.2. Milking: Good Process Practices
 - 8.3.3. On-Farm Milk Pretreatment: Filtration, Refrigeration and Alternative Preservation Methods

- 8.3.4. Treatments in the dairy industry: clarification and bactofugation, skimming, standardization, homogenization, deaeration. Pasteurization. Definition Procedures, treatment temperatures and limiting factors
 - 8.3.4.1. Types of Pasteurizers. Packaging. Quality Control Sterilization. Definition
 - 8.3.4.2. Methods: Conventional, UHT, Other Systems. Packaging. Quality control Manufacturing defects
 - 8.3.4.3. Types of Pasteurized and Sterilized Milk. Selection of Milk Milkshakes and Flavored Milks. Mixing Process. Enriched Milks. Enrichment Process
 - 8.3.4.4. Evaporated Milk. Condensed Milk
- 8.3.5. Preservation and Packaging Systems
- 8.3.6. Quality control of powdered milk
- 8.3.7. Milk Packaging Systems and Quality Control
- 8.4. Milk and Dairy Products. Eggs and Egg Products I
 - 8.4.1. Dairy Products. Creams and Butters
 - 8.4.2. Manufacturing Process. Continuous Manufacturing Methods. Packaging and preservation. Manufacturing Defects and Alterations
 - 8.4.3. Fermented Milk. Yogurt. Milk Preparatory Treatments. Processes and systems of elaboration
 - 8.4.3.1. Types of Yogurt. Problems in the Elaboration. Quality Control
 - 8.4.3.2. BIO Products and Other Acidophilic Milks
 - 8.4.4. Cheese Making Technology: Preparatory Milk Treatments
 - 8.4.4.1. Obtaining the Curd: Syneresis. Pressed. Salted
 - 8.4.4.2. Water Activity in Cheese. Brine Control and Conservation
 - 8.4.4.3. Cheese Ripening: Agents Involved. Factors that determine maturation. Effects of Contaminating Biota
 - 8.4.4.4. Toxicological Problems of Cheese
 - 8.4.5. Additives and Antifungal Treatments
 - 8.4.6. Ice Cream. Features. Types of Ice Cream. Manufacturing Process
 - 8.4.7. Eggs and Egg Products
 - 8.4.7.1. Fresh egg: processing of fresh egg as a raw material for the production of egg products
 - 8.4.7.2. Egg Products: liquid, frozen and dehydrated
- 8.5. Vegetable Products I
 - 8.5.1. Physiology and Post-Harvest Technology. Introduction
 - 8.5.2. Fruit and Vegetable Production, the Need for Post-Harvest Conservation
 - 8.5.3. Respiration: Respiratory Metabolism and its Influence on Postharvest Preservation and Deterioration of Vegetables
 - 8.5.4. Ethylene: Synthesis and Metabolism. Implication of Ethylene in the Regulation of Fruit Ripening
 - 8.5.5. Fruit Ripening: The Ripening Process, Generalities and Its Control
 - 8.5.5.1. Climacteric and Non-Climacteric Ripening
 - 8.5.5.2. Compositional changes: physiological and biochemical changes during ripening and preservation of fruits and vegetables
- 8.6. Vegetable Products II
 - 8.6.1. Principle of Fruit and Vegetable Preservation by the Control of Environmental Gases. Mode of action and its applications in the preservation of fruits and vegetables
 - 8.6.2. Refrigerated Storage. Temperature Control in the Preservation of Fruits and Vegetables
 - 8.6.2.1. Technological Methods and Applications
 - 8.6.2.2. Cold Damage and Its Control
 - 8.6.3. Transpiration: control of water loss in fruit and vegetable preservation
 - 8.6.3.1. Physical Principles. Control Systems
 - 8.6.4. Postharvest pathology: main deteriorations and rots during fruit and vegetable preservation. Control Systems and Methods
 - 8.6.5. IV Gamma Products
 - 8.6.5.1. Physiology of vegetable products: handling and preservation technologies
- 8.7. Vegetable Products III
 - 8.7.1. Processing of Canned Vegetables: General description of a characteristic canning line for vegetables
 - 8.7.1.1. Examples of the Main Types of Canned Vegetables and Pulses
 - 8.7.1.2. New Products of Vegetable Origin: Cold Soups
 - 8.7.1.4. General Description of a Typical Fruit Packaging Line
 - 8.7.2. Juice and Nectar Processing: Juice Extraction and Juice Treatments
 - 8.7.2.1. Aseptic Processing, Storage and Packaging Systems
 - 8.7.2.2. Production Line Examples of the Main Types of Juices
 - 8.7.2.3. Production and Preservation of Semi-Finished Products: Cremogenated Products

- 8.7.3. Production of Jams, Jellies and Jams: Production and Packaging Process
 - 8.7.3.1. Examples of characteristic processing lines
 - 8.7.3.2. Additives Used in the Manufacture of Jams and Marmalades
- 8.8. Alcoholic Beverages and Oils
 - 8.8.1. Alcoholic Beverages: Wine. Manufacturing Process
 - 8.8.1.1. Beer: Brewing Process. Types
 - 8.8.1.2. Spirits and Liquors: Elaboration Processes and Types
 - 8.8.2. Fats and Oils: Introduction
 - 8.8.2.1. Olive Oil: Olive Oil Extraction System
 - 8.8.2.2. Seed Oils. Extraction
 - 8.8.3. Animal Fats: Refining of Fats and Oils
- 8.9. Meat and Meat By-Products
 - 8.9.1. Meat Industry: Production and Consumption
 - 8.9.2. Classification and Functional Properties of Muscle Proteins: Myofibrillar, Sarcoplasmic and Stromal Proteins
 - 8.9.2.1. Muscle-to-Meat Conversion: Porcine Stress Syndrome
 - 8.9.3. Maturation of meat. Factors affecting the quality of meat for direct consumption and industrialization
 - 8.9.4. Curing Chemistry: Ingredients, Additives and Curing Coadjuvants
 - 8.9.4.1. Industrial Curing Processes: Dry and Wet Curing Processes
 - 8.9.4.2. Nitrite Alternatives
 - 8.9.5. Raw and raw marinated meat products: fundamentals and problems of their preservation. Characteristics of Raw Materials
 - 8.9.5.1. Types of Products. Manufacturing Operations
 - 8.9.5.2. Alterations and Defects
 - 8.9.6. Cooked sausages and cooked hams: basic principles of the preparation of meat emulsions. Characteristics and Selection of Raw Materials
 - 8.9.6.1. Technological Manufacturing Operations. Industrial Systems
 - 8.9.6.2. Alterations and Defects

- 8.10. Seafood
 - 8.10.1. Fish and Shellfish. Characteristics of Technological Interest
 - 8.10.2. Main Industrial Fishing and Shellfishing Gear
 - 8.10.2.1. Unit Operations in Fish Technology
 - 8.10.2.2. Fish Cold Preservation
 - 8.10.3. Salting, pickling, drying and smoking: technological aspects of manufacturing
 - 8.10.3.1. Characteristics of the Final Product. Performance
 - 8.10.4. Commercialization

Module 9. Risk Analysis in the Food Industry

- 9.1. Food Safety and Risk Analysis (RA) Principles
 - 9.1.1. Concept of Food Safety. Historical Background
 - 9.1.1.1. First Issues in Food Safety
 - 9.1.1.2. Food Crises
 - 9.1.2. Evolution of Food Safety
 - 9.1.2.1. Food Safety in the Food Industry
 - 9.1.3. Hazard Analysis (HA)
 - 9.1.3.1. Definition of Hazard and Origins of Food Hazards
 - 9.1.3.2. Biotic Hazards
 - 9.1.3.3. Main Sources of Contamination in Foods
 - 9.1.3.4. Bacteria and Bacterial Toxins
 - 9.1.3.5. Foodborne Zoonoses. Surveillance of Foodborne Zoonoses and Reportable Foodborne Diseases
 - 9.1.4. Emerging, Re-emerging, and New Foodborne Diseases: Microbial Adaptation and Anthropogenic Factors
 - 9.1.5. Prevention and Control: Barrier Theory and Food Preservation

- 9.2. Biotic Hazards in the Food Industry I: Epidemiological Surveillance of Foodborne Zoonoses
 - 9.2.1. General Characteristics: Health Importance, Prevalence, Epidemiology, and Control Measures
 - 9.2.1.1. Brucellosis
 - 9.2.1.2. Tuberculosis
 - 9.2.1.3. Listeria
 - 9.2.1.4. Q Fever
 - 9.2.2. Gram-Negative Bacilli from Spore-Producing Bacteria: Health Importance, Prevalence, and Epidemiology
 - 9.2.2.1. Bacillus
 - 9.2.2.2. Clostridium
 - 9.2.3. Non-Spore-Forming Gram-Negative Bacilli: Health Importance, Prevalence, and Epidemiology
 - 9.2.3.1. Campylobacteriosis
 - 9.2.3.2. Salmonellosis
 - 9.2.3.3. Shigellosis
 - 9.2.3.4. *E. coli*
 - 9.2.3.5. *Yersinia*
 - 9.2.3.6. *Vibrio*
- 9.3. Biotic Hazards in the Food Industry II: Viruses, Prions, and Parasites
 - 9.3.1. Viruses and Prions: General Characteristics, Health Importance, Prevalence, and Control and Mitigation Measures
 - 9.3.1.1. Norovirus
 - 9.3.1.2. Rotavirus
 - 9.3.3.3. Hepatitis A
 - 9.3.3.4. Hepatitis E
 - 9.3.3.5. Coronavirus
 - 9.3.3.6. Transmissible Spongiform Encephalopathy
 - 9.3.2. Parasites: General Characteristics, Health Importance, Prevalence, and Control and Mitigation Measures
 - 9.3.2.1. Protozoa: Toxoplasma, Giardia, and Cryptosporidium
 - 9.3.2.2. Nematodes: Trichinella, Anisakis, Diphylobotrium
 - 9.3.3.3. Trematodes: Taenia, Fasciola, Paragonimus, Clonorchis
- 9.4. Abiotic Hazards in the Food Industry I
 - 9.4.1. Risk Assessment of Chemical Agents in Food
 - 9.4.1.1. Health-Based Guideline Values
 - 9.4.1.2. Safety Factors/Uncertainty and Specific Chemical Adjustment Factors
 - 9.4.1.3. NOEL/NOAEL, LOEL/LOAEL, No-Effect Level
 - 9.4.1.4. Acute Reference Dose
 - 9.4.2. Natural Compounds Present in Foods
 - 9.4.2.1. Toxic Products of Plant Origin
 - 9.4.2.2. Toxic Products of Animal Origin
 - 9.4.2.3. Allergens
 - 9.4.2.4. Control and Mitigation Measures
 - 9.4.3. Compounds Generated During Food Processing
 - 9.4.3.1. Contaminants from Food Production Processes: Acrylamides
 - 9.4.3.2. Compounds Generated During Storage: Biogenic Amines
 - 9.4.3.3. Exposure Assessment
- 9.5. Abiotic Hazards in the Food Industry II
 - 9.5.1. Environmental Contaminants and Waste from Primary Production
 - 9.5.1.1. Heavy Metals
 - 9.5.1.2. Persistent Organic Pollutants (POPs)
 - 9.5.1.3. Pesticides
 - 9.5.1.4. Veterinary Drug Residues
 - 9.5.1.5. Exposure Assessment

- 9.5.2. Control and Mitigation Measures
- 9.5.3. Contaminants Added During Food Production Processes
 - 9.5.3.1. Food Additives
 - 9.5.3.2. Processing Aids
 - 9.5.3.3. Materials in Contact with Food
- 9.5.4. Control and Mitigation Measures
- 9.6. Sampling Plans and Establishment of Microbiological Criteria in the Food Industry
 - 9.6.1. Basic Sampling Requirements
 - 9.6.2. Sampling Plan and Sampling Errors
 - 9.6.3. Conservation, Transport, and Storage of Samples
 - 9.6.3.1. Sampling Manual and Laboratory Recordkeeping
 - 9.6.4. Examples of Risk Analysis Applications in the Food Industry
- 9.7. Food Safety Management Systems in the Food Industry
 - 9.7.1. Introduction to Food Safety Management
 - 9.7.2. Prerequisite Plans
 - 9.7.2.1. Concept and Characteristics of Prerequisites
 - 9.7.2.2. Water Monitoring Plan
 - 9.7.2.3. Supplier Control Plan
 - 9.7.2.4. Cleaning and Disinfection Plan for Facilities and Equipment
 - 9.7.2.5. Pest Control Plan
 - 9.7.2.6. Training and Personal Hygiene Control Plan for Handlers
 - 9.7.2.7. Equipment Maintenance Plan
 - 9.7.2.8. Traceability Plan
 - 9.7.3. Implementation of HACCP
 - 9.7.3.1. Preliminary Activities
 - 9.7.3.2. HACCP Plan Principles

- 9.8. Food Defense as a Protection Measure in the Food Industry
 - 9.8.1. Justification for Food Defense Plans in the Food Industry
 - 9.8.2. Differences and Similarities Between Food Defense and Food Safety
 - 9.8.3. Development and Implementation of a Food Defense Plan
 - 9.8.4. Crisis Management in the Food Industry
- 9.9. Risk Assessment and Estimation of Food Safety Objectives
 - 9.9.1. Introduction to Risk Assessment
 - 9.9.2. Tolerable Consumer Protection Level
 - 9.9.3. Establishing Food Safety Objectives
 - 9.9.4. Relationship Between FSO and Quantitative Risk Assessment
 - 9.9.5. Establishing an FSO Based on Quantitative Risk Determination
- 9.10. New Concepts in Food Safety Management: Adequate Protection Level and Food Safety Objective
 - 9.10.1. Introduction to Food Safety Management
 - 9.10.2. Adequate Level of Protection (ALOP)
 - 9.10.3. Food Safety Objective (FSO) and Related Concepts (Performance Objectives PO)
 - 9.10.4. Relationship Between ALOP and FSO

Module 10. Quality and Food Safety Management

- 10.1. Food Safety and Consumer Protection
 - 10.1.1. Definition and Basic Concepts
 - 10.1.2. Evolution of Food Quality and Safety
 - 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 Myths: 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

- 10.3. Cleaning and Disinfection Plan
 - 10.3.1. Dirt Components
 - 10.3.2. Detergents and Disinfectants: Composition and Functions
 - 10.3.3. Stages of Cleaning and Disinfection
 - 10.3.4. Cleaning and Disinfection Program
 - 10.3.5. Current Regulations
- 10.4. Pest Control
 - 10.4.1. The Pest Control Plan
 - 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 and Good Handling Practices Plan (GHP)
 - 10.5.1. Structure of a Traceability Plan
 - 10.5.2. Current Regulations Associated with Traceability
 - 10.5.3. GHP Associated with Food Processing
 - 10.5.3.1. Food Handlers
 - 10.5.3.2. Requirements to Be Fulfilled
 - 10.5.3.3. Hygiene Training Plans
- 10.6. Elements in Food Safety Management
 - 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 Control Plan
 - 10.6.4.2. Associated Current Regulations
 - 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. Design of the Hazard Analysis Critical Control Point (HACCP) Plan
 - 10.8.1. General Guidelines to Be Followed for Its Implementation: Underlying Principles and Prerequisite Program
 - 10.8.2. Management Commitment
 - 10.8.3. Configuration of HACCP Resources
 - 10.8.4. Description of the Product and Identification of Its Intended Use
 - 10.8.5. Flow Diagrams
- 10.9. Development of the HACCP Plan
 - 10.9.1. Characterization of Critical Control Points (CCP)
 - 10.9.2. The Seven Basic Principles of the HACCP Plan
 - 10.9.2.1. Hazard 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. Characterization of Critical Control Points
 - 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

Clinical Internship

After completing the online theoretical period, the program includes a practical training period at a leading food company. In this way, graduates will have the support of a personal tutor, who will accompany them throughout the process and dedicate 100% of their time to both preparation and development of the internship.



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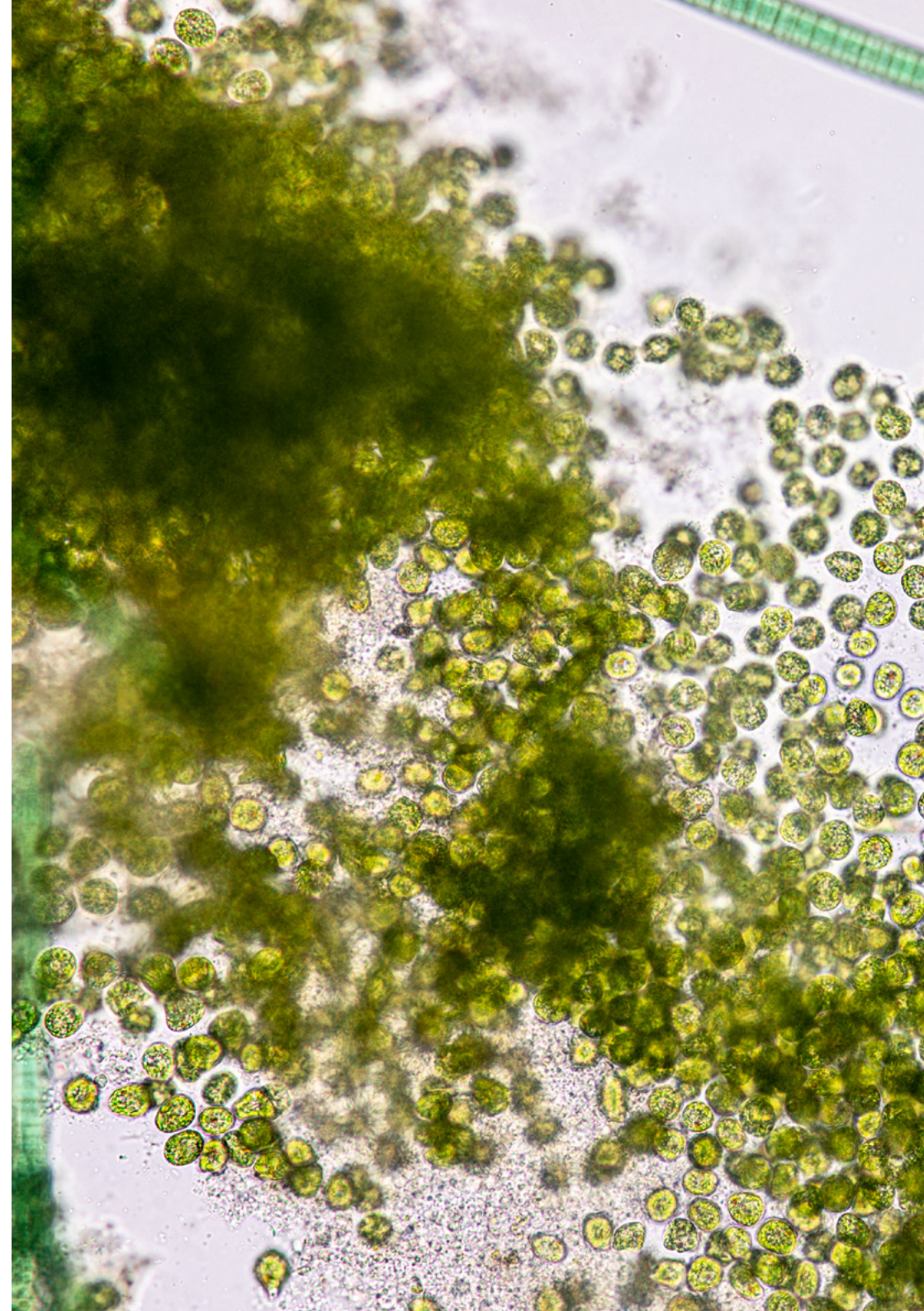
The internship will provide the opportunity to work directly in industrial and laboratory environments, applying advanced techniques in microbiological, chemical, and physical analysis”

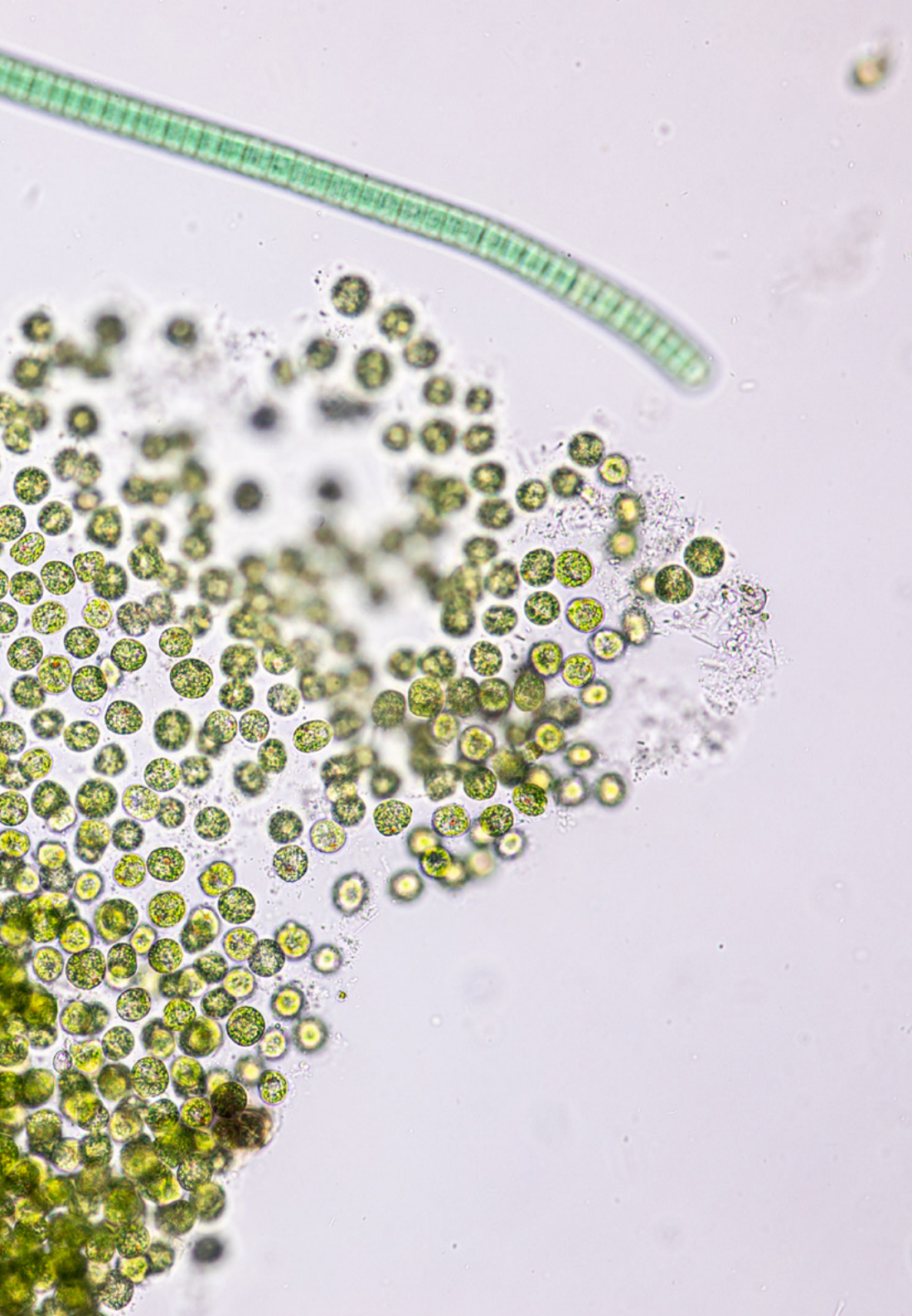
The Practical Training period for this Comprehensive Risk Analysis and Assessment in the Food Industry program consists of a 3-week internship at a prestigious company specializing in this field, with sessions running Monday to Friday for 8 consecutive hours of hands-on training, supported and guided by an assigned specialist. This placement will allow graduates to work on real projects alongside a team of leading professionals in the field, applying the most innovative procedures.

In this training proposal, each activity is designed to strengthen and refine the key competencies required for specialized practice in this field. In this way, the professional profile will be enhanced, driving a strong, efficient, and highly competitive performance.

The practical teaching will be done with the accompaniment and guidance of professors and other fellow trainees that facilitate teamwork and multidisciplinary integration as transversal competencies for medical praxis (learning to be and learning to relate).

The procedures described below will be the basis of the specialization, and their realization will be subject to the center's own availability, its usual activity and workload, the proposed activities being the following:





Module	Practical Activity
Risk Analysis	Identify potential risks in the food production chain
	Evaluate the probability and impact of identified risks
	Develop specific risk analysis models for the food industry
	Conduct food safety and risk audits
Quality and Food Safety Management	Implement food quality and safety management systems
	Monitor compliance with food safety regulations and standards
	Design contingency plans to mitigate food risks
	Conduct inspections and quality controls at various stages of production
Comprehensive Risk Evaluation	Analyze statistical data and trends related to food risks
	Use tools and software for comprehensive risk evaluation
	Prepare technical reports and recommendations based on risk assessments
	Present evaluation results to management and other stakeholders
Policy and Procedure Development	Create internal risk management policies in the food industry
	Develop standard operating procedures for risk management
	Establish communication protocols and emergency response plans
	Coordinate training programs on risk management for staff
Research and Development	Participate in research projects on new risk evaluation methodologies
	Collaborate with multidisciplinary teams on food safety innovations
	Publish articles and studies in specialized journals
	Attend conferences and seminars to update knowledge and share experiences

Civil Liability Insurance

This institution's main concern is to guarantee the safety of the trainees and other collaborating agents involved in the internship process at the company. Among the measures dedicated to achieve this is the response to any incident that may occur during the entire teaching-learning process.

To this end, this entity commits to purchasing a civil liability insurance policy to cover any eventuality that may arise during the course of the internship at the center.

This liability policy for interns will have broad coverage and will be taken out prior to the start of the Internship Program period. That way professionals will not have to worry in case of having to face an unexpected situation and will be covered until the end of the internship program at the center.



General Conditions of the Internship Program

The general terms and conditions of the internship agreement for the program are as follows:

1. TUTOR: During the Hybrid Master's Degree, students will be assigned two tutors who will accompany them throughout the process, answering any doubts and questions that may arise. On the one hand, there will be a professional tutor belonging to the internship center who will have the purpose of guiding and supporting the student at all times. On the other hand, they will also be assigned an academic tutor whose mission will be to coordinate and help the students during the whole process, solving doubts and facilitating everything they may need. In this way, the student will be accompanied and will be able to discuss any doubts that may arise, both clinical and academic.

2. DURATION: The internship program will have a duration of three continuous weeks, in 8-hour days, five days a week. The days of attendance and the schedule will be the responsibility of the center and the professional will be informed well in advance so that they can make the appropriate arrangements.

3. ABSENCE: If the student does not show up on the start date of the Hybrid Master's Degree, they will lose the right to it, without the possibility of reimbursement or change of dates. Absence for more than two days from the internship, without justification or a medical reason, will result in the professional's withdrawal from the internship, therefore, automatic termination of the internship. Any problems that may arise during the course of the internship must be urgently reported to the academic tutor.

4. CERTIFICATION: Professionals who pass the Hybrid Professional Master's Degree will receive a certificate accrediting their stay at the center.

5. EMPLOYMENT RELATIONSHIP: the Hybrid Master's Degree shall not constitute an employment relationship of any kind.

6. PRIOR EDUCATION: Some centers may require a certificate of prior education for the Hybrid Master's Degree. In these cases, it will be necessary to submit it to the TECH internship department so that the assignment of the chosen center can be confirmed.

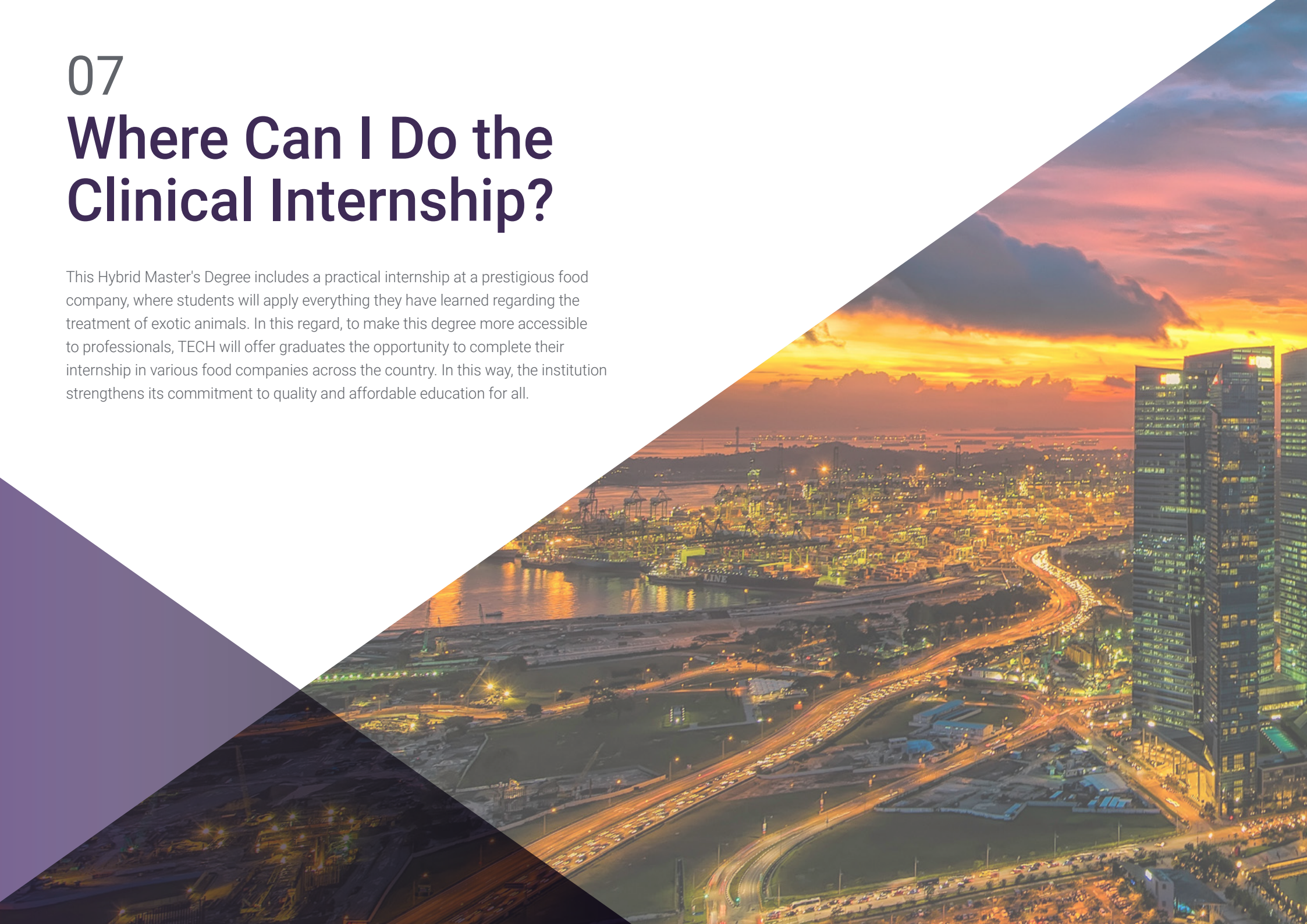
7. DOES NOT INCLUDE: The Hybrid Master's Degree will not include any element not described in the present conditions. Therefore, it does not include accommodation, transportation to the city where the internship takes place, visas or any other items not listed

However, students may consult with their academic tutor for any questions or recommendations in this regard. The academic tutor will provide the student with all the necessary information to facilitate the procedures in any case.

07

Where Can I Do the Clinical Internship?

This Hybrid Master's Degree includes a practical internship at a prestigious food company, where students will apply everything they have learned regarding the treatment of exotic animals. In this regard, to make this degree more accessible to professionals, TECH will offer graduates the opportunity to complete their internship in various food companies across the country. In this way, the institution strengthens its commitment to quality and affordable education for all.



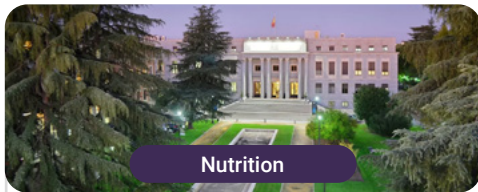
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The internship is an integral part of this program, as it will prepare you to effectively and professionally face any challenge in Comprehensive Risk Analysis and Assessment in the Food Industry”

tech 46 | Where Can I Do the Clinical Internship?



The student will be able to complete the practical part of this Hybrid Master's Degree at the following centers:



Nutrition

CSIC

Country	City
Spain	Madrid

Address: Calle Serrano, 117, Chamartín,
28006 Madrid

Spanish State Agency for Scientific Research and Technological
Development

Related internship programs:
- Geotechnics and Foundations





“

Boost your career path with holistic teaching, allowing you to advance both theoretically and practically”

08

Study Methodology

TECH is the world's first university to combine the **case study** methodology with **Relearning**, a 100% online learning system based on guided repetition.

This disruptive pedagogical strategy has been conceived to offer professionals the opportunity to update their knowledge and develop their skills in an intensive and rigorous way. A learning model that places students at the center of the educational process giving them the leading role, adapting to their needs and leaving aside more conventional methodologies.



“

TECH will prepare you to face new challenges in uncertain environments and achieve success in your career”

The student: the priority of all TECH programs

In TECH's study methodology, the student is the main protagonist.

The teaching tools of each program have been selected taking into account the demands of time, availability and academic rigor that, today, not only students demand but also the most competitive positions in the market.

With TECH's asynchronous educational model, it is students who choose the time they dedicate to study, how they decide to establish their routines, and all this from the comfort of the electronic device of their choice. The student will not have to participate in live classes, which in many cases they will not be able to attend. The learning activities will be done when it is convenient for them. They can always decide when and from where they want to study.

“

*At TECH you will NOT have live classes
(which you might not be able to attend)”*



The most comprehensive study plans at the international level

TECH is distinguished by offering the most complete academic itineraries on the university scene. This comprehensiveness is achieved through the creation of syllabi that not only cover the essential knowledge, but also the most recent innovations in each area.

By being constantly up to date, these programs allow students to keep up with market changes and acquire the skills most valued by employers. In this way, those who complete their studies at TECH receive a comprehensive education that provides them with a notable competitive advantage to further their careers.

And what's more, they will be able to do so from any device, pc, tablet or smartphone.

“*TECH's model is asynchronous, so it allows you to study with your pc, tablet or your smartphone wherever you want, whenever you want and for as long as you want*”

Case Studies and Case Method

The case method has been the learning system most used by the world's best business schools. Developed in 1912 so that law students would not only learn the law based on theoretical content, its function was also to present them with real complex situations. In this way, they could make informed decisions and value judgments about how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

With this teaching model, it is students themselves who build their professional competence through strategies such as Learning by Doing or Design Thinking, used by other renowned institutions such as Yale or Stanford.

This action-oriented method will be applied throughout the entire academic itinerary that the student undertakes with TECH. Students will be confronted with multiple real-life situations and will have to integrate knowledge, research, discuss and defend their ideas and decisions. All this with the premise of answering the question of how they would act when facing specific events of complexity in their daily work.



Relearning Methodology

At TECH, case studies are enhanced with the best 100% online teaching method: Relearning.

This method breaks with traditional teaching techniques to put the student at the center of the equation, providing the best content in different formats. In this way, it manages to review and reiterate the key concepts of each subject and learn to apply them in a real context.

In the same line, and according to multiple scientific researches, reiteration is the best way to learn. For this reason, TECH offers between 8 and 16 repetitions of each key concept within the same lesson, presented in a different way, with the objective of ensuring that the knowledge is completely consolidated during the study process.

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



A 100% online Virtual Campus with the best teaching resources

In order to apply its methodology effectively, TECH focuses on providing graduates with teaching materials in different formats: texts, interactive videos, illustrations and knowledge maps, among others. All of them are designed by qualified teachers who focus their work on combining real cases with the resolution of complex situations through simulation, the study of contexts applied to each professional career and learning based on repetition, through audios, presentations, animations, images, etc.

The latest scientific evidence in the field of Neuroscience points to the importance of taking into account the place and context where the content is accessed before starting a new learning process. Being able to adjust these variables in a personalized way helps people to remember and store knowledge in the hippocampus to retain it in the long term. This is a model called Neurocognitive context-dependent e-learning that is consciously applied in this university qualification.

In order to facilitate tutor-student contact as much as possible, you will have a wide range of communication possibilities, both in real time and delayed (internal messaging, telephone answering service, email contact with the technical secretary, chat and videoconferences).

Likewise, this very complete Virtual Campus will allow TECH students to organize their study schedules according to their personal availability or work obligations. In this way, they will have global control of the academic content and teaching tools, based on their fast-paced professional update.



The online study mode of this program will allow you to organize your time and learning pace, adapting it to your schedule"

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

1. Students who follow this method not only achieve the assimilation of concepts, but also a development of their mental capacity, through exercises that assess real situations and the application of knowledge.
2. Learning is solidly translated into practical skills that allow the student to better integrate into the real world.
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.

The university methodology top-rated by its students

The results of this innovative teaching model can be seen in the overall satisfaction levels of TECH graduates.

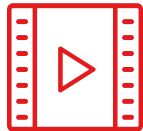
The students' assessment of the teaching quality, the quality of the materials, the structure of the program and its objectives is excellent. Not surprisingly, the institution became the top-rated university by its students according to the global score index, obtaining a 4.9 out of 5.

Access the study contents from any device with an Internet connection (computer, tablet, smartphone) thanks to the fact that TECH is at the forefront of technology and teaching.

You will be able to learn with the advantages that come with having access to simulated learning environments and the learning by observation approach, that is, Learning from an expert.



As such, the best educational materials, thoroughly prepared, will be available in this program:



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.

This content is then adapted in an audiovisual format that will create our way of working online, with the latest techniques that allow us to offer you high quality in all of the material that we provide you with.



Practicing Skills and Abilities

You will carry out activities to develop specific competencies and skills in each thematic field. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop within the framework of the globalization we live in.



Interactive Summaries

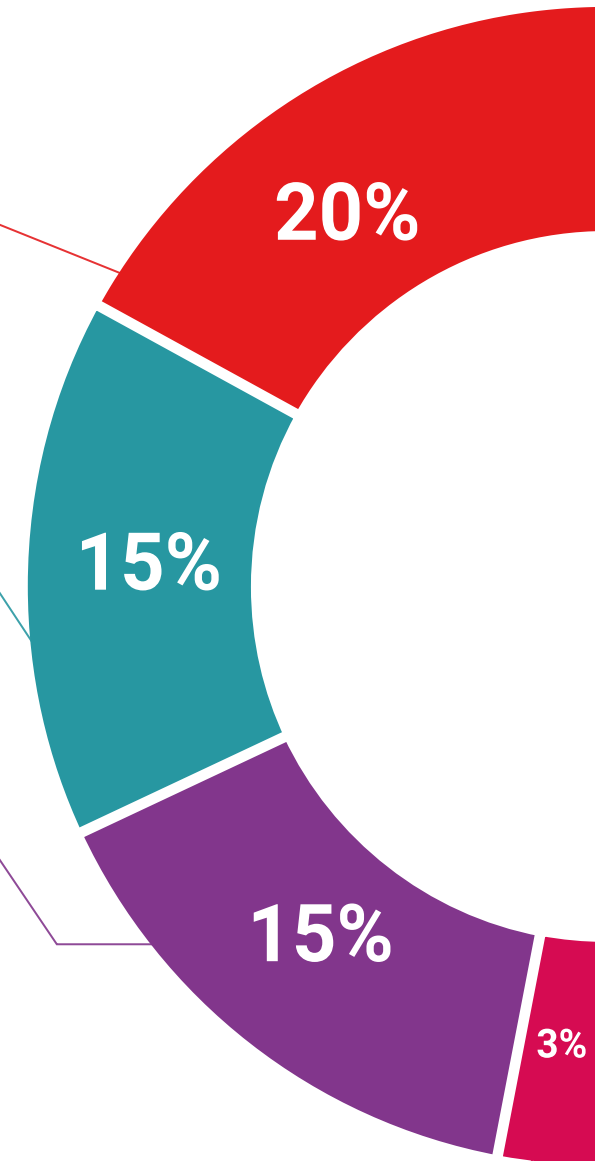
We present the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

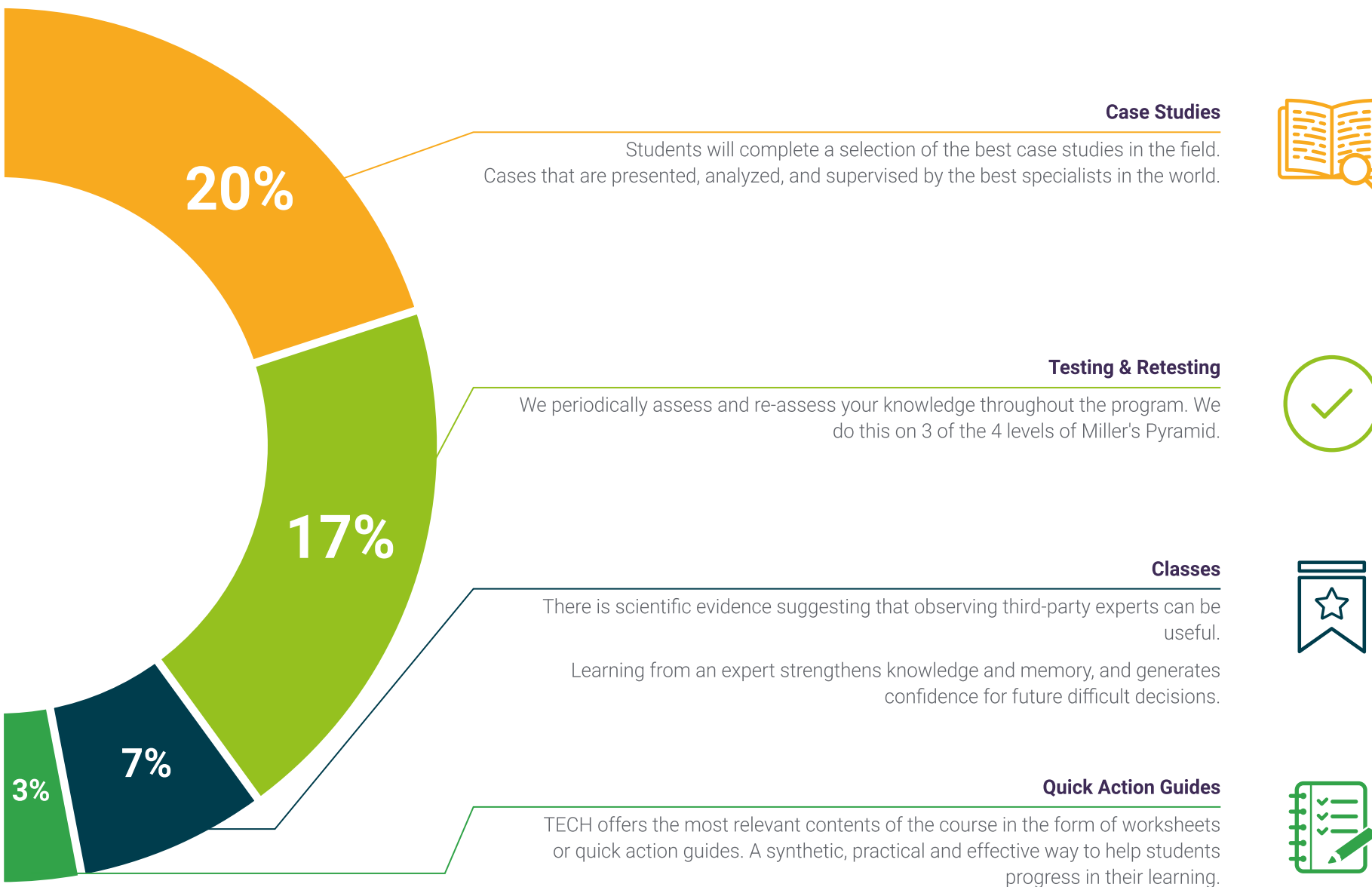
This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".



Additional Reading

Recent articles, consensus documents, international guides... In our virtual library you will have access to everything you need to complete your education.





09 Certificate

The Hybrid Master's Degree in Comprehensive Risk Analysis and Assessment in the Food Industry guarantees students, in addition to the most rigorous and up-to-date education, access to a diploma for the Hybrid 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 diploma for the **Hybrid Master's Degree in Comprehensive Risk Analysis and Assessment in the Food Industry** 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.



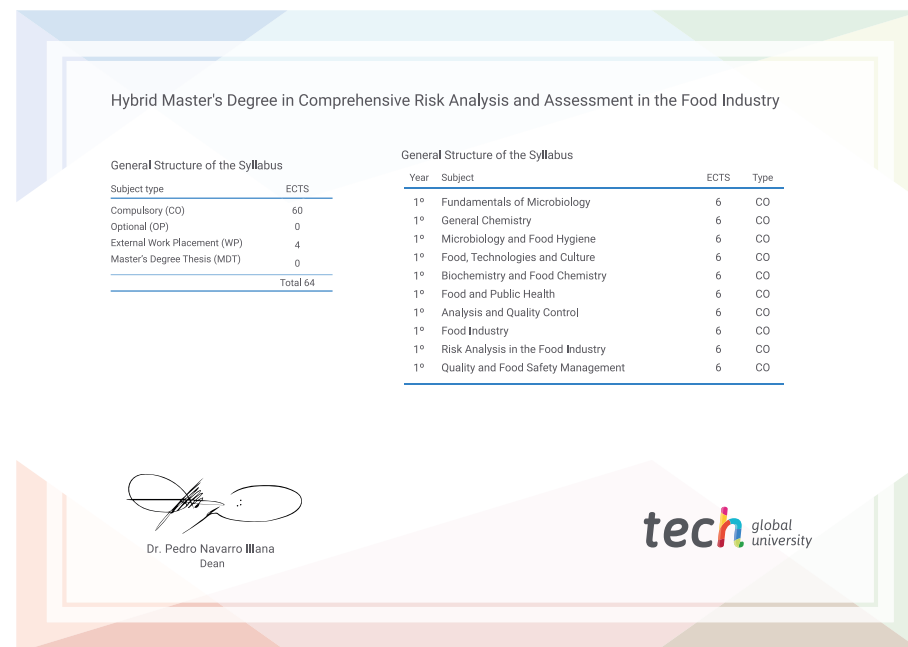
This **TECH Global University** private qualification, is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Hybrid Master's Degree in Comprehensive Risk Analysis and Assessment in the Food Industry**

Modality: **online**

Duration: **12 months**

Accreditation: **60 + 4 ECTS**





Hybrid Master's Degree

Comprehensive Risk
Analysis and Assessment
in the Food Industry

Modality: Hybrid (Online + Clinical Internship)

Duration: 12 months

Certificate: TECH Global University

Credits: 60 + 4 ECTS

Hybrid Master's Degree

Comprehensive Risk
Analysis and Assessment
in the Food Industry