Postgraduate Certificate

Chemical Engineering in Food Bioprocesses

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Postgraduate Certificate

Chemical Engineering in Food Bioprocesses

- Modality: **online**
- Duration: **12 weeks**
- Certificate: **TECH Global University**
- Credits: **12 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Website: **www.techtitute.com/us/nutrition/postgraduate-certificate/chemical-engineering-food-bioprocesses**

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01

Introduction

The benefits offered by chemistry are very useful within the food industry, since they allow improving food quality, minimizing environmental impact, developing new products and generating an excellent optimization of production processes, being bioprocesses one of them. These are in charge of composing new products or destroying hazardous waste and for their implementation, it is necessary to count on the specialized knowledge of professionals. For this reason, TECH has designed a program focused on training its participants in the most essential chemical concepts that can be applied in Bioprocesses. All this, 100% online, a benefit that will allow them to have more control over their time.

Acquires analytical and problem solving skills, fundamental in decision making during the application of chemistry in Bioprocesses"

Food Bioprocesses, which combine Chemical Engineering, are a discipline in constant evolution that seeks to optimize food production and improve its nutritional value, thus contributing to the improvement of the health and welfare of the population. This Postgraduate Certificate program will provide students with the most important technical concepts for the implementation of the virtues offered by this science in food production.

This will be achieved through the complete academic itinerary that is composed of two modules that bring together all the necessary elements to master this field in depth. Thus, students will learn about chemical fundamentals and processes, including matter and energy balances in chemically reactive and non-chemically reactive systems. In addition, the techniques of integrated food science, such as size reduction and augmentation, will be addressed.

Likewise, professionals will improve their skills and knowledge to face the challenges that exist within this constantly evolving labor market, in which they will be able to apply all their learning immediately and increase their professional expectations to a higher level.

This program is offered through the innovative Relearning methodology, which allows 100% online learning, giving students the flexibility to study from anywhere and at any time that suits them. In addition, they will have access to multimedia resources 24 hours a day, allowing them to assimilate the content at their own pace. In addition, through the analysis of practical cases, participants will develop problem-solving skills by facing simulations of realistic situations.

This **Postgraduate Certificate in Chemical Engineering in Food Bioprocesses** contains the most complete and up-to-date scientific program on the market. The most important features include:

- The development of case studies presented by experts in Chemical Engineering in Food Bioprocesses
- The 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

Discover how to implement the basic concepts of chemistry and apply them with great skill in food production"

Access multimedia resources 24 hours a day to assimilate content and keep up to date with the latest trends in the food industry"

Take advantage of this opportunity and learn at your own pace, without the need to go to a study center.

Take advantage of the flexibility offered by the Relearning methodology and study 100% online from anywhere and at the time that suits you best.

The program's teaching staff includes professionals from 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 professional 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 professional must try to solve the different professional practice situations that are presented throughout the academic course. This will be done with the help of an innovative system of interactive videos made by renowned experts.

02

Objectives

The main objective of the educational program is to offer students the latest updates in the Food Industry, providing them with an in-depth knowledge of the definitions of the chemical concepts involved in Food Bioprocesses. This will enable them to face the challenges of the market with confidence and understand in detail how it develops. All this will be achieved through the study of multimedia resources that will strengthen participants' skills.

Learn about the latest trends in Chemical Engineering applied to Food Bioprocesses and acquire technical skills at the forefront of this sector"

General Objectives

- Know the influence that chemical engineering has had in recent years in the production and creation of foodstuffs
- Identify the main quality processes to which food products are subjected
- Apply knowledge of food chemistry in dietetics and nutrition
- Recognize the influence of Bromatology and its related aspects in the qualitative and quantitative food composition
- Analyze new technologies and their contribution to the food production process

Specific Objectives

- Ability to classify processes into discontinuous, semi-continuous and continuous, and to differentiate whether an operation is performed in a steady or non-steady state
- 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
- 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
- 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
- Know, understand and use the principles of the basic fundamentals and technological processes suitable for the production, packaging and preservation of foodstuffs
- Evaluate the impact of processing on food properties
- Determine the suitability of technological advances for food and process innovation in the food industry
- Ability to know, understand and use the facilities of agri-food industries, their equipment and auxiliary machinery of the agri-food industry
- Ability to know, understand and control processes in the agri-food industry. Modeling and optimization of food processes

Chemistry and the food industry have much more in common than you think and thanks to this program you will be able to integrate both in a professional manner"

03

Structure and Content

The program of studies of this Postgraduate Certificate has been designed by recognized experts in the Food Industry, with the objective of providing students with a high quality education. Thus, participants will have the opportunity to obtain a concrete definition of the technical concepts of Chemical Engineering and their implementation in Food Bioprocesses. This will be achieved through the use of multimedia resources and the analysis of case studies, which will allow students to develop outstanding professional skills in this field.

With the contents of this syllabus and the knowledge you have in this field, you will be able to increase your skills to a higher level"

Module 1. Chemical Engineering Fundamentals

1.1. Introduction to Chemical Engineering
- 1.1.1. The Chemical Process Industry: General Characteristics
- 1.1.2. Unit and Stage Operations
- 1.1.3. Stationary and Non-Stationary Regime
- 1.1.4. International System of Units
- 1.1.5. The Food Industry, Chemical Engineering and the Environment

1.2. Material Balance in Systems Without Chemical Reaction
- 1.2.1. General Formula for the Total Material Balance and Applied to a Component
- 1.2.2. Application of Material Balances: Systems with Bypass Current, Recirculation and Purge
- 1.2.3. Steady State Systems
- 1.2.4. Non-Steady State Systems

1.3. Material Balance in Systems with Chemical Reaction
- 1.3.1. General Concepts: Stoichiometric Equation, Stoichiometric Coefficient, Extensive and Intensive Conversion
- 1.3.2. Degree of Conversion and Limiting Reactant
- 1.3.3. Application of the Material Balances to Reactive Systems
  - 1.3.3.1. Reactor/Separator System with Recirculation of Unconverted Reactant
  - 1.3.3.2. Reactor/Separator System with Recirculation and Purge

1.4. Heat Energy Balances
- 1.4.1. Types of Energy: Formula for Total Energy Balance
- 1.4.2. Energy balance in Steady State and Non-Steady State Systems
- 1.4.3. Application of the Energy Balance in Reactive Systems
- 1.4.4. Heat Energy Balances

1.5. Mechanical Energy Balances
- 1.5.1. Mechanical Energy Balance
- 1.5.2. Bernoulli's Equation
- 1.5.3. Pressure Gauges: Manometers

1.6. Chemical Kinetics and Reactor Engineering
- 1.6.1. Definitions and Basic Concepts in Applied Chemical Kinetics and Reactor Engineering
- 1.6.2. Classification of Reactions Expression of Reaction Rate Equations
- 1.6.3. Study of the Dependence of Velocity on Temperature
- 1.6.4. Reactor Classification
  - 1.6.4.1. Ideal Reactors: Design Equations and Characteristics
  - 1.6.4.2. Problem Solving

1.7. Velocity Equations in Constant Volume Reactors
- 1.7.1. Velocity Equations for Elementary Reactions: Integral and Differential Methods
- 1.7.2. Reversible reactions
- 1.7.3. Parallel and Series Reactions
- 1.7.4. Problem Solving

1.8. Reactor Design for the Food Industry
- 1.8.1. General Characteristics of Reactor
- 1.8.2. Types of Ideal Reactors
  - 1.8.2.1. Discontinuous Ideal Reactor
  - 1.8.2.2. Steady-State Complete Mix Flow Reactor
  - 1.8.2.3. Stationary Piston Flow Reactor
- 1.8.3. Comparative Analysis of Reactors
- 1.8.4. Production: Optimum Reactor Size
- 1.8.5. Problem Solving

1.9. Chemical Thermodynamics and Solutions
- 1.9.1. Systems, States and State Functions. Work and heat
- 1.9.2. Principles of Thermodynamics Enthalpy: Hess' Law
- 1.9.3. Entropy and Gibs´ Free Energy
- 1.9.4. Solutions: Solubility and Saturation Solution Concentration

1.10. Chemical Equilibrium
- 1.10.1. Chemical Equilibrium Reaction Rate and Equilibrium Constant Formula
- 1.10.2. Types of Equilibria: Homogeneous and Heterogeneous
- 1.10.3. Displacement of Chemical Equilibrium: Le Chatelier's Principle
- 1.10.4. Solubility Equilibrium Precipitation Reactions

Module 2. Food Technology I

2.1. Introduction to Food Science and Technology
- 2.1.1. Historical Development
- 2.1.2. Concept of Food Science and Technology
- 2.1.3. Objectives of Food Technology. Relationships With Other Sciences
- 2.1.4. Worldwide Food Industries

2.2. Preparation Methods Including Dry and Wet Preparation and Peeling
- 2.2.1. Reception of Food in the Food Industry and Preparation of Raw Material
- 2.2.2. Cleaning: Dry and wet Methods
- 2.2.3. Selection and Classification
- 2.2.4. Main hair Methods
- 2.2.5. Peeling Equipment

2.3. Downsizing and Upsizing
- 2.3.1. General Objectives
- 2.3.2. Dry Food Size Reduction Equipment and applications
- 2.3.3. Fibrous Food Size Reduction Equipment and applications
- 2.3.4. Effect on Foods
- 2.3.5. Size Reduction of Liquid Foodstuffs: Homogenization and Atomization
  - 2.3.5.1. Equipment and applications
- 2.3.6. Enlargement techniques: Enlargement: Agglomeration, Instantaneous Agglomeration or Granulation

2.4. Causes and Factors Involved in Food Spoilage
- 2.4.1. Description of the Causes of Food Spoilage
- 2.4.2. Factors Involved in Food Spoilage
- 2.4.3. Actions to Combat Physical and Chemical Spoilage
- 2.4.4. Possible Actions to Prevent or Delay Microbial Activity

2.5. Blanching processing
- 2.5.1. General Aspects. Objectives
- 2.5.2. Blanching Methods: Steam, Hot Water and other Methods
- 2.5.3. Evaluation of Blanching in Fruits and Vegetables
- 2.5.4. Equipment Facilities
- 2.5.5. Effects on the Nutritional and Sensory Properties of Foods

2.6. Fundamentals of thermobacteriology
- 2.6.1. Basis of Thermobacteriology
- 2.6.2. Kinetics of Microbial Destruction by Heat
- 2.6.3. Survival Graph Value Concept D. Thermal Destruction Graphs
- 2.6.4. Z-value: Concept of Commercial Sterility
- 2.6.5. F and Fo Values Practical Examples of Heat Treatment Calculations in the Canning Industry

2.7. Pasterization
- 2.7.1. Concepts and Objectives
- 2.7.2. Types of Pasteurization Applications in the Food Industry
- 2.7.3. Effect on Foods
  - 2.7.3.1. Milk Pasteurization: Lactoperoxidase Test

2.8. Sterilization
- 2.8.1. Objectives
- 2.8.2. Sterilization of packaged foods
- 2.8.3. Filling, evacuation and container closing operations
- 2.8.4. Types of Sterilizers: Discontinuous and Continuous UHT Treatment
- 2.8.5. Effect on Foods

2.9. Microwave heating
- 2.9.1. General aspects of electromagnetic radiations
- 2.9.2. Microwave characteristics
- 2.9.3. Dielectric properties of the material
- 2.9.4. Conversion of Microwave Energy into Heat Equipment Applications
- 2.9.5. Effect on Foods

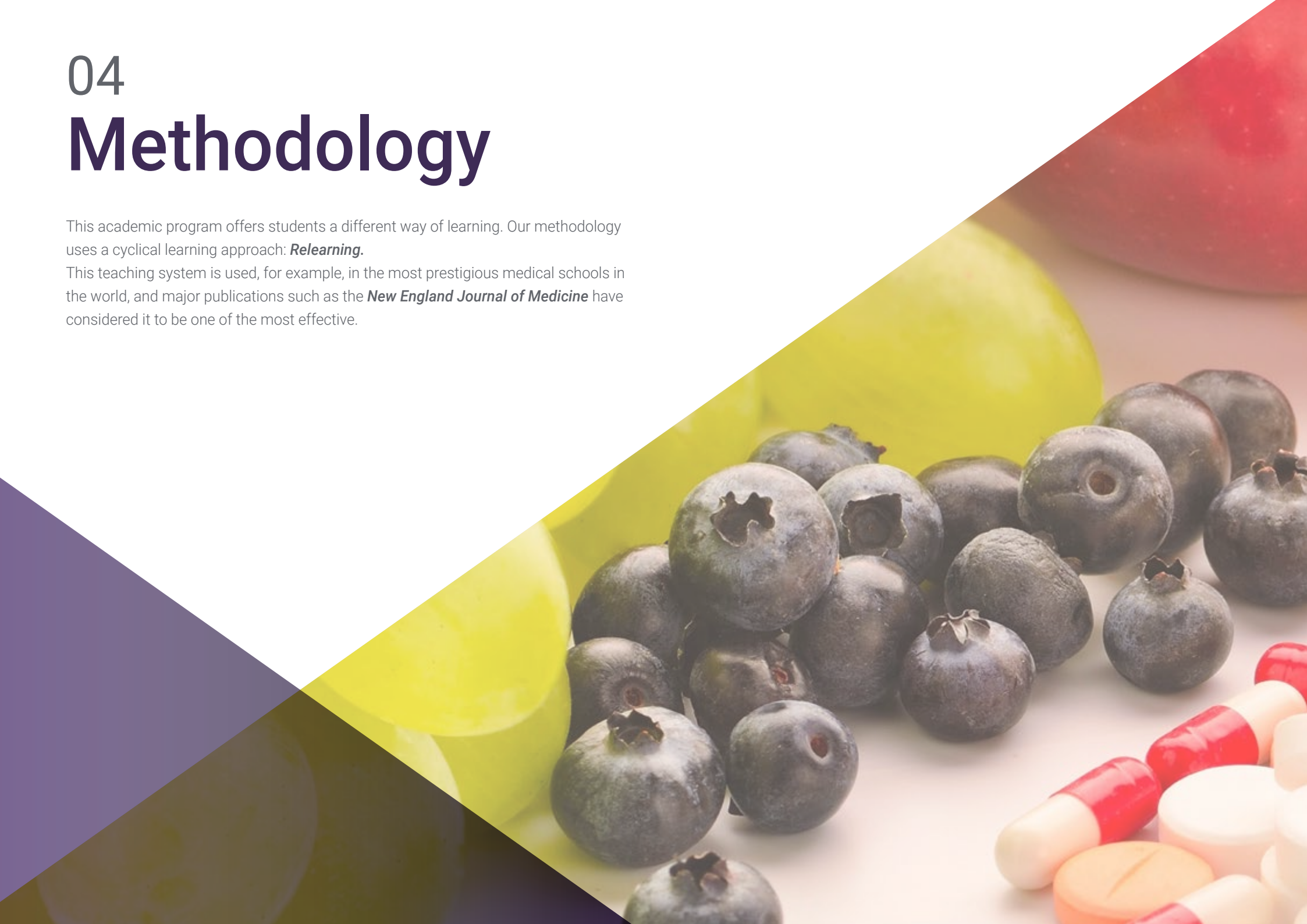
2.10. Infrared Radiation
- 2.10.1. Theoretical aspects
- 2.10.2. Equipment and Facilities Applications
- 2.10.3. Others Non-Ionizing Radiation

04

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.

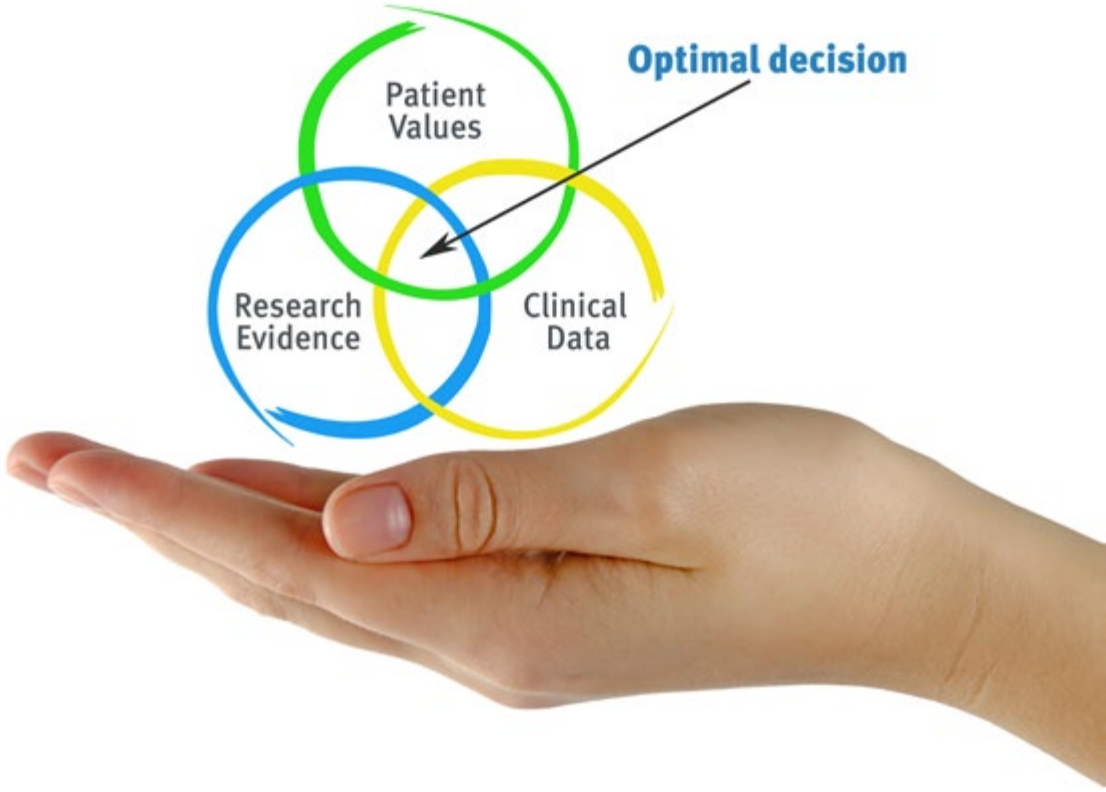


Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"

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:

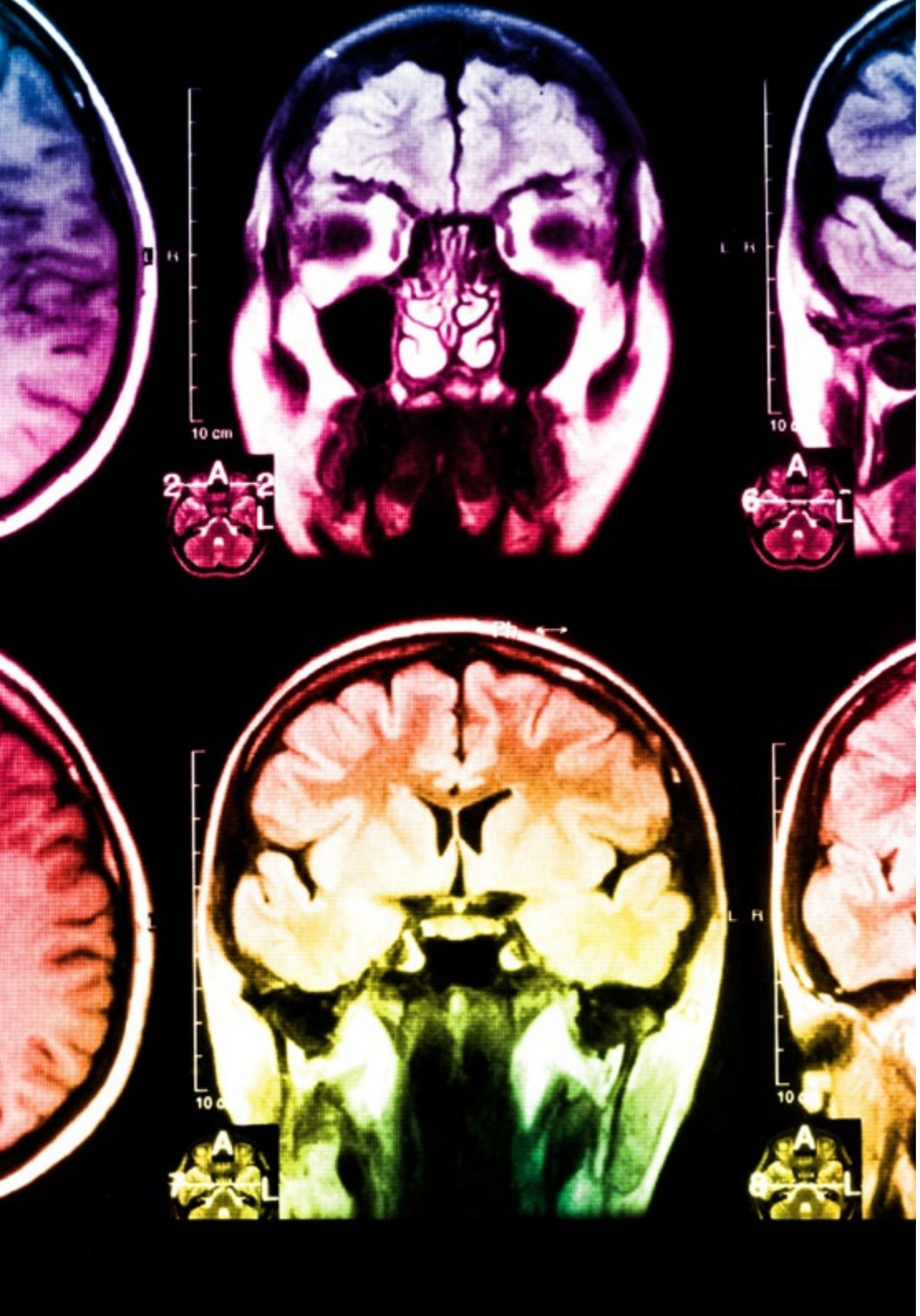
1. Nutritionists who follow this method not only achieve the assimilation of concepts, but also a development of their mental capacity through exercises to evaluate real situations and the application of knowledge.
2. Learning is solidly translated into practical skills that allow the nutritionist to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

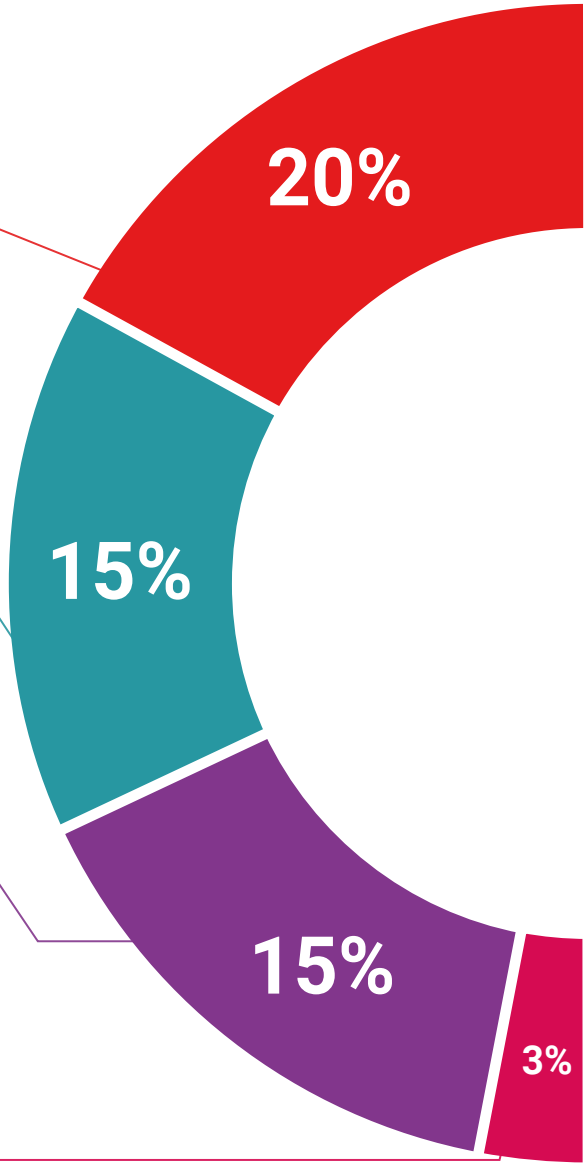
Interactive Summaries

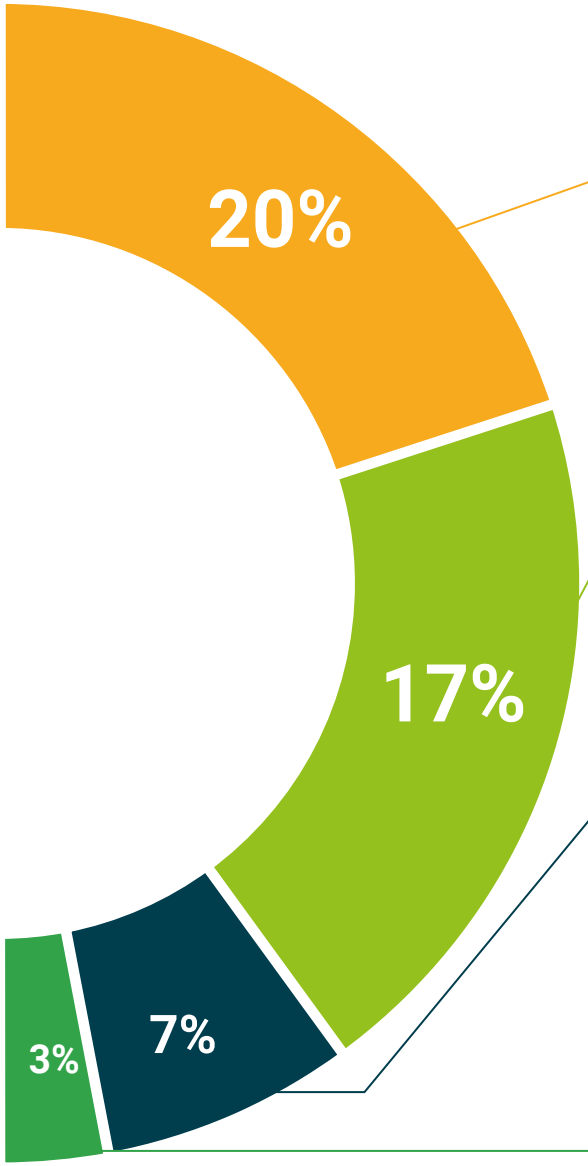
The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

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.

05

Certificate

The Postgraduate Certificate in Chemical Engineering in Food Bioprocesses guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Global University.

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

This program will allow you to obtain your **Postgraduate Certificate in Chemical Engineering in Food Bioprocesses** 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** title 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: **Postgraduate Certificate in Chemical Engineering in Food Bioprocesses**

Modality: **online**

Duration: **12 weeks**

Accreditation: **12 ECTS**


tech global university

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

Postgraduate Certificate in Chemical Engineering in Food Bioprocesses

This is a program of 360 hours of duration equivalent to 12 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
Rector

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

*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.

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