

Postgraduate Diploma

Biotechnology in the Field of Clinical Analysis



Postgraduate Diploma Biotechnology in the Field of Clinical Analysis

- » Modality: online
- » Duration: 6 months
- » Certificate: TECH Global University
- » Credits: 18 ECTS
- » Schedule: at your own pace
- » Exams: online

Website: www.techtute.com/us/medicine/postgraduate-diploma/postgraduate-diploma-biotechnology-field-clinical-analysis

Index

01

Introduction

p. 4

02

Objectives

p. 8

03

Course Management

p. 12

04

Structure and Content

p. 16

05

Methodology

p. 26

06

Certificate

p. 34

01

Introduction

The numerous advances and developments in the field of biotechnology have led to an evolution in laboratory work in these same areas. This requires the professional to keep up to date in order to develop their skills in new workplace scenarios.

In this complete Postgraduate Diploma, we offer you the possibility of achieving this in a simple and very efficient way. Through the most developed teaching techniques, you will learn the theory and practice of all the advances needed to work in a clinical analysis laboratory at a high level. With a structure and plan that is totally compatible with your personal and professional life.



“

*Update your knowledge in all the advances in
Biotechnology in the Field of Clinical Analysis with
the most efficient teaching system on the market”*

The specialty of Clinical Analysis is eminently multidisciplinary in nature, and it is the students themselves who must focus on those aspects in which they are lacking training, depending on their educational background.

The clinical professional will achieve, with the expert study, excellence in the knowledge of instrumental techniques and sample collection techniques as the basis of analytical methodology, one of the fundamental points of their specialization as specialists in the area. With the completion of this Postgraduate Diploma, the expectations of learning and handling of instrumental techniques are exceeded, offering specialized preparation to perform these functions in the laboratory.

However, in recent decades, Biochemistry has experienced a great boost due to the advancement of research techniques, thus allowing for the possibility of a more molecular and scientific development of Medicine.

The most clinical part of this modality is oriented to the analysis in hospital laboratories that allows the assistance to the patient as a clinical support of the doctors. Therefore, research in clinical biochemistry or biomedicine is an essential science nowadays since it serves to study the molecular mechanisms of the physiological processes that occur in our organism and at the same time, they allow investigating the failure of these physiological processes and their consequences for health.

In an application closer to medicine, the research and techniques developed in genetics are of great use for the study of the cause, transmission and pathogenesis of numerous diseases. The objective of genetic medicine is to understand the different types of genetic alterations that give rise to diseases, analyze their transmission, identify carriers, and develop methods of prevention and treatment.

This **Postgraduate Diploma in Biotechnology in the Field of Clinical Analysis** contains the most complete and up-to-date scientific program on the market. Its most notable features are:

- ♦ The latest technology in online teaching software
- ♦ A highly visual teaching system, supported by graphic and schematic contents that are easy to assimilate and understand
- ♦ Practical cases presented by practising experts
- ♦ State-of-the-art interactive video systems.
- ♦ Teaching supported by telepractice
- ♦ Continuous updating and recycling systems
- ♦ Autonomous learning: full compatibility with other occupations
- ♦ Practical exercises for self-evaluation and learning verification
- ♦ Support groups and educational synergies: questions to the expert, debate and knowledge forums.
- ♦ Communication with the teacher and individual reflection work
- ♦ Content that is accessible from any fixed or portable device with an Internet connection
- ♦ Supplementary documentation databases are permanently available, even after the course



A compendium and deepening of knowledge that will lead you to excellence in your profession"



A highly qualified Postgraduate Diploma that will allow you to be one of the best trained professionals in Biotechnology in the field of Clinical Analysis in the clinical analysis laboratory"

The professors of this Postgraduate Diploma are professionals currently working in a modern and accredited Clinical Laboratory, with a very solid training base and up-to-date knowledge in both scientific and purely technical disciplines.

In this way, we ensure that we provide you with the training update we are aiming for. A multidisciplinary team of professionals trained and experienced in different environments, who will cover the theoretical knowledge in an efficient way, but, above all, will put the practical knowledge derived from their own experience at the service of the course: one of the differential qualities of this course.

This training of the subject is complemented by the effectiveness of the methodological design of this Postgraduate Diploma in Biotechnology in the Field of Clinical Analysis. Developed by a multidisciplinary team of experts, it integrates the latest advances in educational technology. In this way, you will be able to study with a range of convenient and versatile multimedia tools that will give you the operability you need in your specialization.

The design of this program is based on Problem-Based Learning: an approach that conceives learning as a highly practical process. To achieve this remotely, we will use telepractice: with the help of an innovative interactive video system, and learning from an expert, you will be able to acquire the knowledge as if you were actually dealing with the scenario you are learning about. A concept that will allow you to integrate and fix learning in a more realistic and permanent way.

Our innovative telepractice concept will give you the opportunity to learn through an immersive experience, which will provide you with a faster integration and a much more realistic view of the contents: "Learning from an Expert"

The learning of this Postgraduate Diploma is developed through the most advanced didactic means in online teaching to guarantee that your effort will have the best possible results.



02 Objectives

The objective of this training is to offer professionals who work in clinical analysis laboratories, the necessary knowledge and skills to perform their duties using the most advanced protocols and techniques of the moment. Through a work approach that is fully adaptable to the student, this Postgraduate Diploma will progressively lead you to acquire the skills that will propel you to a much higher professional level.





“

Learn from the best and study the techniques and work procedures of Clinical Analysis to be able to work in the best laboratories in the field.



General Objectives

- Apply the instrumental techniques in the resolution of problems in health analysis.
- Establish the molecular bases of human diseases.
- Know the routine procedures used in the field of biomedicine and the clinical analysis for generating, transmitting and divulging the scientific information.
- Develop skills for the analysis, synthesis and critical reasoning in the application of the scientific method.
- Identify different genetic alterations and analyze the causes and possible consequences.
- Establish and define the different types of genetically based diseases and substantiate the causes of these diseases.
- Present the latest advances in the field of genetic medicine, genomics and personalized medicine.



A boost to your CV that will give you the competitiveness of the best prepared professionals in the labor market"





Specific Objectives

Module 1 Instrumental Techniques in the Clinical Analysis Laboratory.

- ♦ Compile the instrumental techniques used in a clinical analysis laboratory.
- ♦ Determine the procedures involved in microscopic, microbiological, spectral, molecular biology, separation and cell counting techniques.
- ♦ Desarrollar los conceptos fundamentales teóricos para la comprensión de las técnicas instrumentales en profundidad
- ♦ Establish the direct applications of instrumental techniques of clinical analysis in human health as a diagnostic and preventive element.
- ♦ Analyze the necessary process prior to the use of instrumental techniques that should be developed in the clinical analysis laboratory.
- ♦ Justify the rationale for using one practice over another based on diagnostic, staffing, management and other factors.
- ♦ Propose a practical learning of instrumental techniques through the use of clinical cases, practical examples and exercises.
- ♦ Evaluate the information obtained from the use of instrumental techniques for the interpretation of results.

Module 2 Biochemistry II

- ♦ Develop specialised knowledge of the different molecular mechanisms implicated in the biological process.
- ♦ Analyze the relative problems in the molecular bases of physiological processes and their consequences.
- ♦ Gain advanced knowledge in relation to the genetic bases of diseases.
- ♦ Demonstrate a good management of laboratory practice with clinical orientation.

- ♦ Analyze experimental approaches and their limitations. Interpret scientific results and establish a relationship between these results and the genetic basis of a disease.
- ♦ Identify the applications of molecular diagnostic applications in clinical practice.

Module 3 Genetics

- ♦ Construct detailed family trees and perform segregation analysis.
- ♦ Examine karyotypes and identify chromosomal abnormalities.
- ♦ Analyze the probability of transmission of genetically based diseases and identify potential carriers.
- ♦ Study the fundamentals of the application of different molecular biology techniques for the diagnosis and investigation of genetic diseases: PCR, hybridization techniques, restriction and sequencing assays, among others.
- ♦ Interpret the results obtained from analysis techniques used in the characterization of genetic alterations or molecular markers.
- ♦ Identify different genetically based diseases in detail, establish their causes and diagnostic methods.
- ♦ Establish the legal and ethical aspects related to medical genetics and the new technologies developed in the field of genetics.
- ♦ Present the new genomic and bio-informatics tools, their benefits and scope of application. Perform searches in genomic databases.

03

Course Management

For our course to be of the highest quality, we are proud to work with a teaching staff of the highest level, chosen for their proven track record. Professionals from different areas and fields of expertise that make up a complete, multidisciplinary team. A unique opportunity to learn from the best.



“

An impressive teaching staff, made up of professionals from different areas of expertise, will be your teachers during your training: a unique opportunity not to be missed”

International Guest Director

Jeffrey Jhang, M.D. is a dedicated expert in Clinical Pathology and Laboratory Medicine. He has won several awards in these areas, including the Dr. Joseph G. Fink Award from the Columbia University College of Medicine and Surgery, among other recognitions from the College of American Pathologists.

His scientific leadership has been latent thanks to his exhaustive work as Medical Director of the Clinical Laboratory Center, attached to the Icahn School of Medicine at Mount Sinai. At the same institution, he coordinates the Department of Transfusion Medicine and Cell Therapy. In addition, Dr. Jhang has held management positions in the Clinical Laboratory at the Langone Health Center of New York University and as Chief of the Laboratory Service at Tisch Hospital.

Through these experiences, the expert has mastered different functions such as the supervision and management of laboratory operations, complying with the main regulatory standards and protocols. In turn, he has collaborated with interdisciplinary teams to contribute to the accurate diagnosis and care of different patients. On the other hand, he has spearheaded initiatives to improve the quality, performance and efficiency of analytical technical facilities.

At the same time, Dr. Jhang is a prolific academic author. His articles are related to scientific research in different health fields ranging from Cardiology to Hematology. In addition, he is a member of several national and international committees that outline regulations for hospitals and laboratories around the world. He is also a regular speaker at congresses, a guest medical commentator on television programs and has participated in several books.



Dr. Jhang, Jeffrey

- ♦ Director of Clinical Laboratories at NYU Langone Health, New York, United States
- ♦ Director of Clinical Laboratories at NYU Tisch Hospital, New York
- ♦ Professor of Pathology at the NYU Grossman School of Medicine
- ♦ Medical Director of the Clinical Laboratory Center at Mount Sinai Health System
- ♦ Director of the Blood Bank and Transfusion Service at Mount Sinai Hospital
- ♦ Director of Hematology and Coagulation Specialty Laboratory at Columbia University Irving Medical Center
- ♦ Director of the Parathyroid Tissue Collection and Processing Center at Columbia University Irving Medical Center
- ♦ Assistant Director of Transfusion Medicine at Columbia University Irving Medical Center
- ♦ Transfusion Medicine Specialist at the New York Blood Bank
- ♦ M.D. from the Icahn School of Medicine at Mount Sinai
- ♦ Anatomic and Clinical Pathology Residency at NewYork-Presbyterian Hospital
- ♦ Member of: American Society for Clinical Pathology
College of American Pathologists



Thanks to TECH, you will be able to learn with the best professionals in the world"

Management



Ms. Cano Armenteros, Montserrat

- ♦ Bachelor's Degree in Biology. University of Alicante
- ♦ Master's Degree in Clinical Trials University of Seville
- ♦ Official Master's Degree in Primary Care Research by the Miguel Hernández University of Alicante for the Doctorate
- ♦ Recognition from the University of Chicago, USA Outstanding
- ♦ Certificate of Pedagogical Aptitude (CAP) University of Alicante

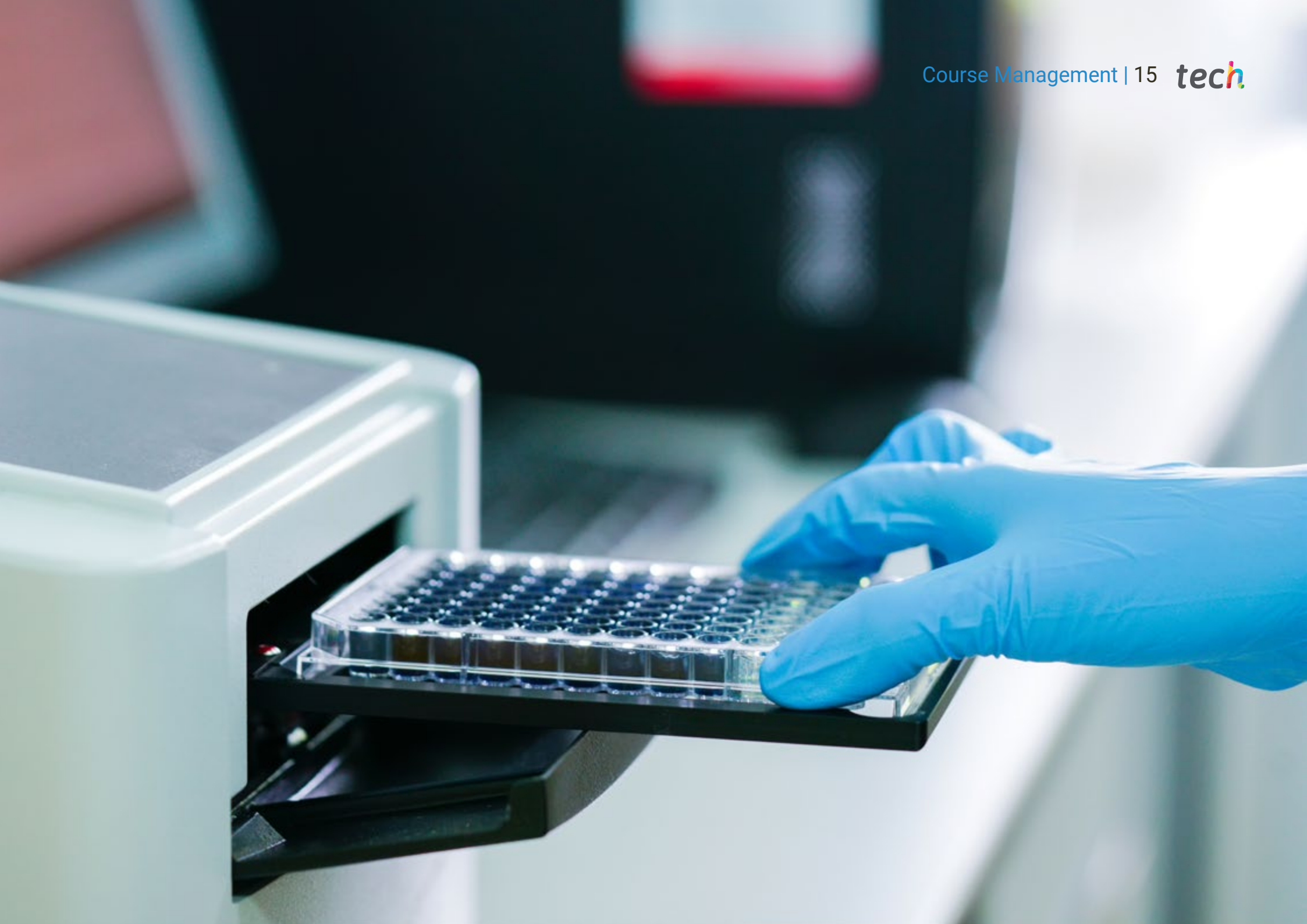
Professors

Dr. Calle Guisado, Violeta

- ♦ PhD in Public and Animal Health from the University of Extremadura. Cum Laude Mention and International PhD obtained in July 2019 and Outstanding Award in her PhD in 2020.
- ♦ Degree in Biology from the University of Extremadura (2012).

Dr. Aparicio Fernández, Cristina

- ♦ Degree in Biotechnology with a Master's Degree in Advanced Immunology.
- ♦ Interuniversity Professional Master's Degree in Advanced Immunology from the University of Barcelona and the Autonomous University of Barcelona in 2020.
- ♦ Degree in Biotechnology from the University of León (2019).



04

Structure and Content

The contents of this Postgraduate Diploma have been developed by the different professors of this course, with a clear purpose: to ensure that our students acquire each and every one of the skills necessary to become true experts in this field.





“

A comprehensive and well-structured program that will take you to the highest standards of quality and success”

Module 1 Instrumental Techniques in the Clinical Analysis Laboratory.

- 1.1. Instrumental Techniques in Clinical Analysis
 - 1.1.1. Introduction
 - 1.1.2. Main Concepts
 - 1.1.3. Classification of Instrumental Methods
 - 1.1.3.1. Classic Methods
 - 1.1.3.2. Instrumental Methods
 - 1.1.4. Preparation of Reagents, Solutions, Buffers and Controls
 - 1.1.5. Equipment Calibration
 - 1.1.5.1. Importance of Calibration
 - 1.1.5.2. Methods of Calibration
 - 1.1.6. Clinical Analysis Process
 - 1.1.6.1. Reasons for Requesting a Clinical Analysis
 - 1.1.6.2. Phases of the Analysis Process
 - 1.1.6.3. Patient Preparation and Sample Taking
- 1.2. Microscopic Techniques in Clinical Analysis
 - 1.2.1. Introduction and Concepts
 - 1.2.2. Types of Microscopes
 - 1.2.2.1. Optical Microscopes
 - 1.2.2.2. Electronic Microscopes
 - 1.2.3. Lenses, Light and Image Formation
 - 1.2.4. Management and Maintenance of Light Optical Microscopes
 - 1.2.4.1. Handling and Properties
 - 1.2.4.2. Maintenance
 - 1.2.4.3. Observation Incidents
 - 1.2.4.4. Application in Clinical Analysis
 - 1.2.5. Other Microscopes Characteristics and Management
 - 1.2.5.1. Dark Field Microscope
 - 1.2.5.2. Polarized Light Microscope
 - 1.2.5.3. Interference Microscope
 - 1.2.5.4. Inverted Microscope
 - 1.2.5.5. Ultraviolet Light Microscope
 - 1.2.5.6. Fluorescence Microscope





- 1.2.5.7. Electronic Microscope
- 1.3. Microbiological Techniques in Clinical Analysis
 - 1.3.1. Introduction and Concept
 - 1.3.2. Design and Work Standards of the Clinical Microbiology Laboratory
 - 1.3.2.1. Necessary Rules and Resources
 - 1.3.2.2. Routines and Procedures in the Laboratory
 - 1.3.2.3. Sterilization and Contamination
 - 1.3.3 Cellular Culture Techniques
 - 1.3.3.1. Growth Environment
 - 1.3.4 Most Commonly Used Extension and Staining Procedures in Clinical Microbiology
 - 1.3.4.1. Bacteria Recognition
 - 1.3.4.2. Cytological
 - 1.3.4.3. Other Procedures
 - 1.3.5 Other Methods of Microbiological Analysis
 - 1.3.5.1. Direct Microscopic Examination Identification of Normal and Pathogenic Flora
 - 1.3.5.2. Identification by Biochemical Tests
 - 1.3.5.3. Rapid Immunological Test
- 1.4. Volumetric, Gravimetric, Electrochemical and Titration Techniques
 - 1.4.1. Volumetrics Introduction and Concept
 - 1.4.1.1. Classification of Methods
 - 1.4.1.2. Laboratory Procedure to Perform a Volumetric Analysis
 - 1.4.2. Gravimetry
 - 1.4.2.1. Introduction and Concept
 - 1.4.2.2. Classification of Gravimetric Methods
 - 1.4.2.3. Laboratory Procedure to Perform a Gravimetric Analysis
 - 1.4.3. Electrochemical Techniques
 - 1.4.3.1. Introduction and Concept
 - 1.4.3.2. Potentiometry
 - 1.4.3.3. Amperometry
 - 1.4.3.4. Coulometry
 - 1.4.3.5. Conductometry

- 1.4.3.6. Application in Clinical Analysis
- 1.4.4. Evaluation
 - 1.4.4.1. Acid Base
 - 1.4.4.2. Precipitation
 - 1.4.4.3. Complex Formation
 - 1.4.4.4. Application in Clinical Analysis
- 1.5. Spectral Techniques in Clinical Analysis
 - 1.5.1. Introduction and Concepts
 - 1.5.1.1. Electromagnetic Radiation and its Interaction with the Material
 - 1.5.1.2. Radiation Absorption and Emission
 - 1.5.2. Spectrophotometry Application in Clinical Analysis
 - 1.5.2.1. Instruments
 - 1.5.2.2. Procedure
 - 1.5.3. Atomic Absorption Spectrophotometry
 - 1.5.4. Flame Emission Photometry
 - 1.5.5. Fluorimetry
 - 1.5.6. Nephelometry and Turbidimetry
 - 1.5.7. Mass and Reflectance Spectrometry
 - 1.5.7.1. Instruments
 - 1.5.7.2. Procedure
 - 1.5.8. Applications of the Most Common Spectral Techniques Currently Used in Clinical Analysis
- 1.6. Immunoanalysis Techniques in Clinical Analysis
 - 1.6.1. Introduction and Concepts
 - 1.6.1.1. Immunological Concepts
 - 1.6.1.2. Types of Immunoanalysis
 - 1.6.1.3. Cross-Reactivity and Antigen
 - 1.6.1.4. Detection Molecules
 - 1.6.1.5. Quantification and Analytical Sensitivity
 - 1.6.2. Immunohistochemical Techniques
 - 1.6.2.1. Concept
 - 1.6.2.2. Immunohistochemical Procedures
- 1.6.3. Enzyme Immunochemical Technique
 - 1.6.3.1. Concept and Procedure
- 1.6.4. Immunofluorescence
 - 1.6.4.1. Concept and Classification
 - 1.6.4.2. Immunofluorescence Procedure
- 1.6.5. Other Methods of Immunoanalysis
 - 1.6.5.1. Immunophelometry
 - 1.6.5.2. Radial Immunodiffusion
 - 1.6.5.3. Immunoturbidimetry
- 1.7. Separation Techniques in Clinical Analysis. Chromatography and Electrophoresis
 - 1.7.1. Introduction and Concepts
 - 1.7.2. Chromatographic Techniques
 - 1.7.2.1. Principles, Concepts and Classification
 - 1.7.2.2. Gas-Liquid Chromatography Concepts and Procedure
 - 1.7.2.3. High Efficacy Liquid Chromatography Concepts and Procedure
 - 1.7.2.4. Thin Layer Chromatography
 - 1.7.2.5. Application in Clinical Analysis
 - 1.7.3. Electrophoretic Techniques
 - 1.7.3.1. Introduction and Concepts
 - 1.7.3.2. Instruments and Procedures
 - 1.7.3.3. Purpose and Field of Application in Clinical Analysis
 - 1.7.3.4. Capillary Electrophoresis
 - 1.7.3.4.1. Serum Protein Electrophoresis
 - 1.7.4. Hybrid Techniques: ICP masses, Gases masses and Liquids masses
- 1.8. Molecular Biology Techniques in Clinical Analysis
 - 1.8.1. Introduction and Concepts
 - 1.8.2. DNA and RNA Extraction Techniques
 - 1.8.2.1. Procedure and Conservation
 - 1.8.3. Chain Reaction of PCR Polymers
 - 1.8.3.1. Concept and Foundation
 - 1.8.3.2. Instruments and Procedures

- 1.8.3.3. Modifications of the PCR Method
- 1.8.4. Hybridization Techniques
- 1.8.5. Sequencing
- 1.8.6. Protein Analysis by Western Blotting
- 1.8.7. Proteomics and Genomics
 - 1.8.7.1. Concepts and Procedures in Clinical Analysis
 - 1.8.7.2. Types of Proteomic Studies
 - 1.8.7.3. Bioinformation and Proteomic
 - 1.8.7.4. Metabolomics
 - 1.8.7.5. Relevance in Biomedicine
- 1.9. Techniques for the Determination of Form Elements Flow Cytometry Bedside Testing
 - 1.9.1. Red Blood Cells Count
 - 1.9.1.1. Cellular Count Procedure.
 - 1.9.1.2. Pathologies Diagnosed with this Methodology
 - 1.9.2. Leukocyte Count
 - 1.9.2.1. Procedure
 - 1.9.2.2. Pathologies Diagnosed with this Methodology
 - 1.9.3. Flow Cytometry
 - 1.9.3.1. Introduction and Concepts
 - 1.9.3.2. Technique Procedure
 - 1.9.3.3. Cytometry Techniques in Clinical Analysis
 - 1.9.3.3.1. Applications in Oncohematology
 - 1.9.3.3.2. Applications in Allergies
 - 1.9.3.3.3. Applications in Infertility
 - 1.9.4. Bedside Testing
 - 1.9.4.1. Concept
 - 1.9.4.2. Types of Samples
 - 1.9.4.3. Techniques Used
 - 1.9.4.4. Most Used Applications in Bedside Testing
- 1.10. Interpretation of Results, Analytical Method Evaluation and Analytical Interferences
 - 1.10.1. Laboratory Report
 - 1.10.1.1. Concept

- 1.10.1.2. Characteristic Elements of a Laboratory Report
- 1.10.1.3. Interpretation of the Report
- 1.10.2. Evaluation of Analytical Methods in Clinical Analysis
 - 1.10.2.1. Concepts and Objectives
 - 1.10.2.2. Linearity
 - 1.10.2.3. Truthfulness
 - 1.10.2.4. Precision
- 1.10.3. Analytical Interferences
 - 1.10.3.1. Concept, Foundation and Classification
 - 1.10.3.2. Endogenous Interferents
 - 1.10.3.3. Exogenous Interferents
 - 1.10.3.4. Procedures for Detecting and Quantifying an Interference in a Specific Method or Analysis

Module 2 Biochemistry II

- 2.1. Congenital Alterations of Carbohydrate Metabolism
 - 2.1.1. Alterations in the Digestion and Intestinal Absorption of Carbohydrates
 - 2.1.2. Galactose Metabolism Alterations
 - 2.1.3. Fructose Metabolism Alterations
 - 2.1.4. Glucogen Metabolism Alterations
 - 2.1.4.1. Glucogenesis: Types
- 2.2. Congenital Alterations of Amino Acid Metabolism
 - 2.2.1. Aromatic Amino Acid Metabolism Alterations
 - 2.2.1.1. Phenylketonuria.
 - 2.2.1.2. Glutaric Aciduria Type 1
 - 2.2.2. Alterations of Branched Amino Acid Metabolism
 - 2.2.2.1. Maple Syrup Urine Disease
 - 2.2.2.2. Isovaleric Acidemia
 - 2.2.3. Alterations in the Metabolism of Sulfur Amino Acids
 - 2.2.3.1. Homocysturia
- 2.3. Congenital Alterations of Lipid Metabolism
 - 2.3.1. Beta-Oxidation of Fatty Acids

- 2.3.1.1. Introduction to Beta-Oxidation of Fatty Acids
 - 2.3.1.2. Fatty Acid Beta-Oxidation Alterations
 - 2.3.2. Carnitine Cycle
 - 2.3.2.1. Introduction to Carnitine Cycle
 - 2.3.2.2. Carnitine Cycle Alterations
 - 2.4. Urea Cycle Disorders
 - 2.4.1. Urea Cycle
 - 2.4.2. Genetic Alterations of the Urea Cycle
 - 2.4.2.1. Ornithine Transcarbamylase (OTC) Deficiency
 - 2.4.2.2. Other Urea Cycle Disorders
 - 2.4.3. Diagnosis and Treatment of Urea Cycle Diseases
 - 2.5. Molecular Pathologies of Nucleotide Bases Alterations of Purine and Pyrimidine Metabolism
 - 2.5.1. Introduction to Purine and Pyrimidine Metabolism
 - 2.5.2. Purine Metabolism Disorders
 - 2.5.3. Pyrimidine Metabolism Disorders.
 - 2.5.4. Diagnosis of Purine and Pyrimidine Disorders
 - 2.6. Porphyrrias. Alterations in the Synthesis of the Heme Group
 - 2.6.1. Heme Group Synthesis
 - 2.6.2. Porphyrrias: Types
 - 2.6.2.1. Liver Porphyrrias
 - 2.6.2.1.1. Acute Porphyrrias
 - 2.6.2.2. Hematopoietic Porphyrrias
 - 2.6.3. Diagnosis and Treatment of Porphyrrias
 - 2.7. Jaundice Bilirubin Metabolism Disorders
 - 2.7.1. Introduction to Bilirubin Metabolism
 - 2.7.2. Congenital Jaundice
 - 2.7.2.1. Unconjugated Hyperbilirubinemia
 - 2.7.2.2. Conjugated Hyperbilirubinemia
 - 2.7.3. Diagnosis and Treatment of Jaundice
 - 2.8. Oxidative Phosphorylation
 - 2.8.1. Mitochondria
 - 2.8.1.1. Mitochondrial Enzyme and Protein Constituents
 - 2.8.2. Electronic Transport Chain
 - 2.8.2.1. Electronic Transporters
 - 2.8.2.2. Electronic Complexes
 - 2.8.3. Coupling of Electronic Transport to ATP Synthesis
 - 2.8.3.1. ATP Synthase
 - 2.8.3.2. Oxidative Phosphorylation Uncoupling Agents
 - 2.8.4. NADH Shuttle
- 2.9. Mitochondrial Disorders
 - 2.9.1. Maternal Inheritance
 - 2.9.2. Heteroplasmy and Homoplasmy
 - 2.9.3. Mitochondrial Diseases
 - 2.9.3.1. Leber Hereditary Optic Neuropathy
 - 2.9.3.2. Leigh Disease
 - 2.9.3.3. MELAS Syndrome
 - 2.9.3.4. Myoclonic Epilepsy with Ragged Red Fibers (MERRF)
 - 2.9.4. Diagnosis and Treatment of Mitochondrial Diseases
- 2.10. Other Disorders Produced by Alterations in Other Organelles
 - 2.10.1. Lysosomes
 - 2.10.1.1. Lysosomal Diseases
 - 2.10.1.1.1. Sphingolipidosis
 - 2.10.1.1.2. Mucopolysaccharidosis
 - 2.10.2. Peroxisomes
 - 2.10.2.1. Lysosomal Diseases
 - 2.10.2.1.1. Zellweger Syndrome
 - 2.10.3. Golgi Apparatus
 - 2.10.3.1. Golgi Apparatus Diseases
 - 2.10.3.1.1. Mucopolipidosis II

Module 3 Genetics

- 3.1. Introduction to Genetic Medicine Genealogies and Inheritance Patterns
 - 3.1.1. Historical Development of Genetics Key Concepts
 - 3.1.2. Structure of Genes and Regulation of Genetic Expression Epigenetics
 - 3.1.3. Genetic Variability Mutation and Reparation of DNA
 - 3.1.4. Human Genetics Organization of the Human Genome
 - 3.1.5. Genetic Diseases Morbidity and Mortality
 - 3.1.6. Human Inheritance Concept of Genotype and Phenotype
 - 3.1.6.1. Mendelian Inheritance Patterns
 - 3.1.6.2. Multigene and Mitochondrial Inheritance
 - 3.1.7. Construction of Genealogies
 - 3.1.7.1. Allele, Genotypic and Phenotypic Frequency Estimation
 - 3.1.7.2 Segregation Analysis
 - 3.1.8. Other Factors which Affect the Phenotype
- 3.2. Molecular Biology Techniques Used in Genetics
 - 3.2.1. Genetics and Molecular Diagnostics
 - 3.2.2. Polymerase Chain Reaction (PCR) Applied to Diagnosis and Research in Genetics
 - 3.2.2.1. Detection and Amplification of Specific Sequences
 - 3.2.2.2. Quantification of Nucleic Acids (RT-PCR)
 - 3.2.3. Cloning Techniques: Isolation, Restriction and Ligation of DNA Fragments
 - 3.2.4. Detection of Mutations and Measurement of Genetic Variability: RFLP, VNTR, SNPs
 - 3.2.5. Mass Sequencing Techniques. NGS
 - 3.2.6. Transgenesis Genetic Therapy
 - 3.2.7. Cytogenetic Techniques
 - 3.2.8.1. Chromosome Banding
 - 3.2.8.2. FISH, CGH
- 3.3. Human Cytogenetics Numerical and Structural Chromosomal Abnormalities
 - 3.3.1. Study of Human Cytogenetics Features
 - 3.3.2. Chromosome Characterization and Cytogenetic Nomenclature
 - 3.3.2.1. Chromosomal Analysis: Karyotype.
 - 3.3.3. Anamolies in the Number of Chromosomes
 - 3.3.3.1. Polyploidies
 - 3.3.3.2. Aneuploidies
 - 3.3.4. Structural Chromosomal Alterations Genetic Dose
 - 3.3.4.1. Deletions
 - 3.3.4.2. Duplications
 - 3.3.4.3. Inversions
 - 3.3.4.4. Translocations
 - 3.3.5. Chromosomal Polymorphisms
 - 3.3.6. Genetic Imprinting
- 3.4. Prenatal Diagnosis of Genetic Alterations and Congenital Defects Preimplantational Genetic Diagnosis
 - 3.4.1. Prenatal Diagnosis. What does it entail?
 - 3.4.2. Incidence of Congenital Defects
 - 3.4.3. Indications for Performing Prenatal Diagnosis
 - 3.4.4. Prenatal Diagnostic Methods
 - 3.4.2.1. Non-Invasive Procedures: First and Second Trimester *Screening* TPNI
 - 3.4.2.2. Invasive Procedures: Amniocentesis, Cordocentesis and Chorionic Biopsy
 - 3.4.5. Preimplantational Genetic Diagnosis Indications.
 - 3.4.6. Embryo Biopsy and Genetic Analysis
- 3.5. Genetic Diseases I
 - 3.5.1. Diseases with Autosomal Dominant Inheritance
 - 3.5.1.1. Achondroplasia
 - 3.5.1.2. Huntington's Disease
 - 3.5.1.3. Retinoblastoma
 - 3.5.1.4. Charcot-Marie-Tooth Disease
 - 3.5.2. Diseases with Autosomal Recessive Inheritance
 - 3.5.2.1. Phenylketonuria.
 - 3.5.2.2. Sickle Cell Anemia
 - 3.5.2.3. Cystic Fibrosis
 - 3.5.2.4. Laron Syndrome

- 3.5.3. Diseases with Sex-Linked Inheritance
 - 3.5.3.1. Rett Syndrome
 - 3.5.3.2. Haemophilia
 - 3.5.3.3. Duchenne Muscular Dystrophy
- 3.6. Genetic Diseases II
 - 3.6.1. Mitochondrial Inheritance Diseases
 - 3.6.1.1. Mitochondrial Encephalomyopathies
 - 3.6.1.2. Leber Hereditary Optic Neuropathy (NOHL)
 - 3.6.2. Genetic Anticipation Phenomena
 - 3.6.2.1. Huntington's Disease
 - 3.6.2.2. Fragile X Syndrome
 - 3.6.2.3. Spinocerebellar Ataxias
 - 3.6.3. Allelic Heterogeneity
 - 3.6.3.1. Usher Syndrome
- 3.7. Complex Diseases Genetics Molecular Basis of Family and Sporadic Cancer
 - 3.7.1. Multifactorial Inheritance
 - 3.7.1.1. Polygenes
 - 3.7.2. Contribution of Environmental Factors on Complex Diseases
 - 3.7.3. Quantative Genetics
 - 3.7.3.1 Heritability
 - 3.7.4. Common Complex Diseases
 - 3.7.4.1. Diabetes Mellitus
 - 3.7.4.2. Alzheimer's Disease
 - 3.7.5. Behavioral Diseases and Personality Disorders: Alcoholism, Autism and Schizophrenia
 - 3.7.6. Cancer: Molecular Base and Environmental Factors
 - 3.7.6.1. Genetics of Cell Proliferation and Differentiation Processes Cellular Cycle
 - 3.7.6.2. DNA Repair Genes, Oncogenes and Tumor Suppressor Genes
 - 3.7.6.3. Environmental Influence of the Occurence of Cancer
 - 3.7.7. Familial Cancer
- 3.8 Genomics and Proteomics
 - 3.8.1. Omic Sciences and their Usefulness in Medicine
 - 3.8.2. Genome Sequencing and Analysis
 - 3.8.2.1. DNA Libraries
 - 3.8.3. Comparative Genomics
 - 3.8.3.1. Organisms Model
 - 3.8.3.2. Sequencing Comparison
 - 3.8.3.3. Human Genome Project
 - 3.8.4. Functional Genomics
 - 3.8.4.1. Transcriptomics
 - 3.8.4.2. Structural and Functional Organization of the Genome
 - 3.8.4.3. Functional Genomic Elements
 - 3.8.5. From the Genome to the Proteome
 - 3.8.5.1. Post-Translational Modifications
 - 3.8.5. Strategies for the Separation and Purification of Proteins
 - 3.8.6. Identification of Proteins
 - 3.8.8. Interactom
- 3.9. Genetic Assessment Ethical and Legal Aspects of Diagnosis and Research in Genetics
 - 3.9.1. Genetic Assessment Concepts and Base Techniques
 - 3.9.1.1. Risk of Recurrence of Genetically Based Diseases
 - 3.9.1.2. Genetic Assessment in Prenatal Diagnosis
 - 3.9.1.3. Ethical Principles in Genetic Assessment
 - 3.9.2. Legislation of New Genetic Technology
 - 3.9.2.1. Genetic Engineering
 - 3.9.2.2. Human Cloning
 - 3.9.2.3. Genetic Therapy
 - 3.9.3. Bioethics and Genetics
- 3.10. Biobanks and Bioinformatics Tools
 - 3.10.1. Biobanks Concept and Functions
 - 3.10.2. Organization, Managment and Quality of Biobanks
 - 3.10.3. Spanish Network of Biobanks
 - 3.10.4. Computational Biology
 - 3.10.5. *Big Data* and *Machine Learning*

- 3.10.6. Bioinformatics Applications in Biomedicine
 - 3.10.6.1. Sequences Analysis
 - 3.10.6.2. Image Analysis
 - 3.10.6.2. Personalized and Precision Medicine



A comprehensive teaching program, structured in well-developed teaching units, oriented towards learning that is compatible with your personal and professional life"

05 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

What should a professional do in a given situation? 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 you will 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 in the physician's professional 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. Students who follow this method not only achieve the assimilation of concepts, but also a development of their mental capacity, through exercises that evaluate 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.



Relearning Methodology

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

Our 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, which represent a real revolution with respect to simply studying and analyzing cases.



The physician 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 250,000 physicians have been trained with unprecedented success in all clinical specialties regardless of surgical load. Our pedagogical methodology is developed in a highly competitive environment, with a university student body with a strong socioeconomic profile and an average age of 43.5 years old.

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.

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.



Surgical Techniques and Procedures on Video

TECH introduces students to the latest techniques, the latest educational advances and to the forefront of current medical techniques. 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 on the usefulness of learning by observing experts. The system known as 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.



06 Certificate

Through a different and stimulating learning experience, you will be able to acquire the necessary skills to take a big step in your training. An opportunity to progress, with the support and monitoring of a modern and specialized university, which will propel you to another professional level.



“

*Successfully complete this specialization
and receive your university certificate
without travel or laborious paperwork”*

This program will allow you to obtain your **Postgraduate Diploma in Biotechnology in the Field of Clinical Analysis** 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.

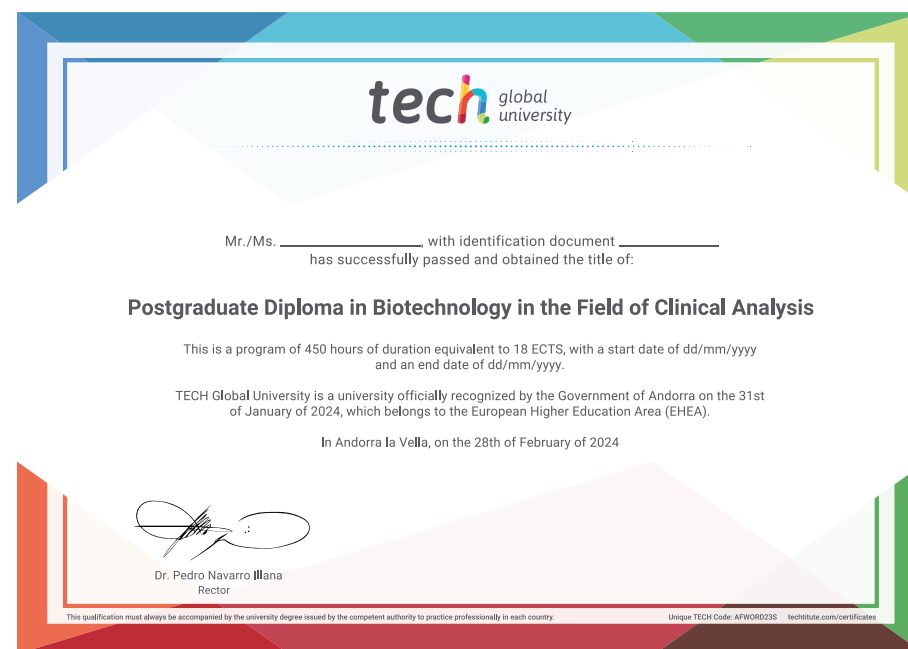
This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Postgraduate Diploma in Biotechnology in the Field of Clinical Analysis**

Modality: **online**

Duration: **6 months**

Accreditation: **18 ECTS**



*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.

future
health confidence people
education information tutors
guarantee accreditation teaching
institutions technology learning
community commitment
personalized service innovation
knowledge present
development language
virtual classroom



Postgraduate Diploma Biotechnology in the Field of Clinical Analysis

- » Modality: online
- » Duration: 6 months
- » Certificate: TECH Global University
- » Credits: 18 ECTS
- » Schedule: at your own pace
- » Exams: online

Postgraduate Diploma

Biotechnology in the Field of Clinical Analysis

