Professional Master's Degree

Clinical Analysis

tech global university

tech global university

Professional Master's Degree

Clinical Analysis

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

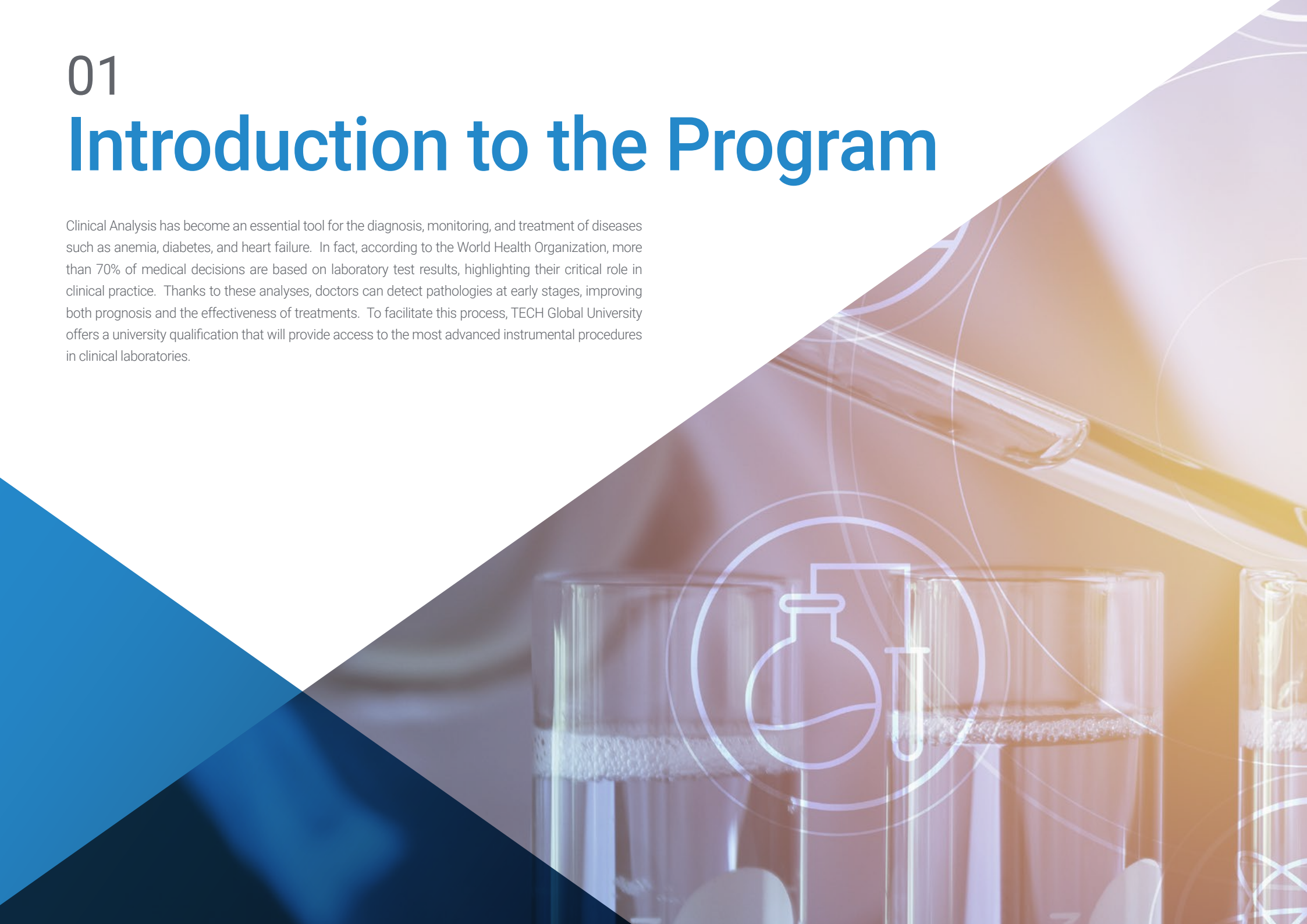
Website: www.techtitute.com/us/medicine/professional-master-degree/master-clinical-analysis

Index

01

Introduction to the Program

Clinical Analysis has become an essential tool for the diagnosis, monitoring, and treatment of diseases such as anemia, diabetes, and heart failure. In fact, according to the World Health Organization, more than 70% of medical decisions are based on laboratory test results, highlighting their critical role in clinical practice. Thanks to these analyses, doctors can detect pathologies at early stages, improving both prognosis and the effectiveness of treatments. To facilitate this process, TECH Global University offers a university qualification that will provide access to the most advanced instrumental procedures in clinical laboratories.



Thanks to this 100% online program, you will enhance the quality of clinical laboratory services through precise, reliable, and efficient analyses, thereby optimizing diagnostic processes"

The Clinical and Biomedical Laboratory is a fundamental pillar in the healthcare system, as it enables the diagnosis of pathologies through the analysis of biological samples. For this reason, the most prestigious healthcare institutions seek specialists in Clinical Analysis capable of providing precision and rigor in result interpretation. However, to stand out in this demanding environment, it is essential to master the most advanced techniques in areas such as Immunoanalysis, Molecular Biology, and Semen Analysis.

In response to this need, TECH Global University offers an innovative Clinical Analysis program, designed to integrate the latest trends in the clinical laboratory field. The syllabus covers essential disciplines such as biochemistry, hematology, and parasitology, providing access to cutting-edge methodologies that optimize the interpretation of diagnostic tests. Additionally, the program delves into the regulatory framework of the sector, ensuring that specialists apply quality, precision, and safety standards in their daily work.

To achieve these objectives, the program is delivered through a 100% online methodology, allowing professionals to progress at their own pace from anywhere with internet access. Moreover, the teaching approach is based on the Relearning method, a learning strategy that reinforces knowledge retention through the systematic repetition of key concepts.

As an added value, the program includes the participation of a prestigious International Guest Director, who will deliver 10 exclusive Masterclasses. Thanks to these sessions, specialists will be able to update their competencies comprehensively and in alignment with the most recent scientific evidence.

This **Professional Master's Degree in Clinical Analysis** contains the most complete and up-to-date scientific program on the market. The most important features include:

- The development of practical case studies presented by experts in Medicine
- 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 the self-assessment process can be carried out 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

A renowned International Guest Director will deliver 10 rigorous Masterclasses on the latest advances in Clinical Analysis"

You will analyze and interpret test results such as lipid profiles, glucose levels, complete blood count, and coagulation to detect metabolic alterations"

You will implement quality control protocols, equipment calibration, and result validation to ensure accuracy and reliability in diagnostics.

You will manage modern methodologies in the preparation, processing, and analysis of blood and other biological fluids using state-of-the-art equipment.

The teaching staff includes professionals belonging to the field of medicine, who contribute their work experience to this program, as well as renowned specialists from reference societies and prestigious universities.

The 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 learning experience designed to prepare for real-life situations.

This program is designed around Problem-Based Learning, whereby the student must try to solve the different professional practice situations that arise throughout the program. For this purpose, the professional will be assisted by an innovative interactive video system created by renowned and experienced experts.

02

Why Study at TECH?

TECH is the world's largest online university. With an impressive catalog of more than 14,000 university programs, available in 11 languages, it is positioned as a leader in employability, with a 99% job placement rate. In addition, it has a huge faculty of more than 6,000 professors of the highest international prestige.

Study at the largest online university in the world and ensure your professional success. The future begins at TECH"

The world's best online university, according to FORBES

The prestigious Forbes magazine, specialized in business and finance, has highlighted TECH as "the best online university in the world" This is what they have recently stated in an article in their digital edition in which they echo the success story of this institution, "thanks to the academic offer it provides, the selection of its teaching staff, and an innovative learning method oriented to form the professionals of the future".

The best top international faculty

TECH's faculty is made up of more than 6,000 professors of the highest international prestige. Professors, researchers and top executives of multinational companies, including Isaiah Covington, performance coach of the Boston Celtics; Magda Romanska, principal investigator at Harvard MetaLAB; Ignacio Wistuba, chairman of the department of translational molecular pathology at MD Anderson Cancer Center; and D.W. Pine, creative director of TIME magazine, among others.

The world's largest online university

TECH is the world's largest online university. We are the largest educational institution, with the best and widest digital educational catalog, one hundred percent online and covering most areas of knowledge. We offer the largest selection of our own degrees and accredited online undergraduate and postgraduate degrees. In total, more than 14,000 university programs, in ten different languages, making us the largest educational institution in the world.

The most complete syllabuses on the university scene

TECH offers the most complete syllabuses on the university scene, with programs that cover fundamental concepts and, at the same time, the main scientific advances in their specific scientific areas. In addition, these programs are continuously updated to guarantee students the academic vanguard and the most demanded professional skills. and the most in-demand professional competencies. In this way, the university's qualifications provide its graduates with a significant advantage to propel their careers to success.

A unique learning method

TECH is the first university to use Relearning in all its programs. This is the best online learning methodology, accredited with international teaching quality certifications, provided by prestigious educational agencies. In addition, this innovative academic model is complemented by the "Case Method", thereby configuring a unique online teaching strategy. Innovative teaching resources are also implemented, including detailed videos, infographics and interactive summaries.

The official online university of the NBA

TECH is the official online university of the NBA. Thanks to our agreement with the biggest league in basketball, we offer our students exclusive university programs, as well as a wide variety of educational resources focused on the business of the league and other areas of the sports industry. Each program is made up of a uniquely designed syllabus and features exceptional guest hosts: professionals with a distinguished sports background who will offer their expertise on the most relevant topics.

Leaders in employability

TECH has become the leading university in employability. Ninety-nine percent of its students obtain jobs in the academic field they have studied within one year of completing any of the university's programs. A similar number achieve immediate career enhancement. All this thanks to a study methodology that bases its effectiveness on the acquisition of practical skills, which are absolutely necessary for professional development.

Google Premier Partner

The American technology giant has awarded TECH the Google Premier Partner badge. This award, which is only available to 3% of the world's companies, highlights the efficient, flexible and tailored experience that this university provides to students. The recognition not only accredits the maximum rigor, performance and investment in TECH's digital infrastructures, but also places this university as one of the world's leading technology companies.

The top-rated university by its students

Students have positioned TECH as the world's top-rated university on the main review websites, with a highest rating of 4.9 out of 5, obtained from more than 1,000 reviews. These results consolidate TECH as the benchmark university institution at an international level, reflecting the excellence and positive impact of its educational model.

03

Syllabus

This comprehensive university program covers the standards and regulations of Clinical Analysis laboratories, enabling professionals to ensure quality and safety in the handling of biological samples. Additionally, it delves into advanced methodologies for monitoring analytical procedures, optimizing diagnostic accuracy. It also incorporates strategies for equipment calibration and test processing, facilitating the validation of clinical results. As a result, the program emphasizes evidence-based medicine, providing the necessary tools to interpret data rigorously and support decisions grounded in updated scientific criteria.

You will identify the components and properties of reagents, solutions, buffers, and controls to ensure their proper preparation"

Module 1. Legal Framework and Standard Parameters of the Clinical Analysis Laboratory

1.1. ISO Standards Applicable to a Modernized Clinical Laboratory
- 1.1.1. Work Flow and Free of Waste
- 1.1.2. Continuous Mapping of Procedures
- 1.1.3. Physical Filing of Personnel Functions
- 1.1.4. Monitoring of Analytical Stages with Clinical Indicators
- 1.1.5. Internal and External Communication Systems

1.2. Safety and Management of Sanitary Waste
- 1.2.1. Safety in a Laboratory Clinic
  - 1.2.1.1. Emergency Evacuation Plan
  - 1.2.1.2. Risk Assessment
  - 1.2.1.3. Standardized Rules of Work
  - 1.2.1.4. Unsupervised Work
- 1.2.2. Management of Sanitary Waste
  - 1.2.2.1. Classes of Sanitary Waste
  - 1.2.2.2. Packaging
  - 1.2.2.3. Destination

1.3. Standardization Model for Sanitary Processes
- 1.3.1. Concepts and Objectives of the Standardization Processes
- 1.3.2. Clinical Variability
- 1.3.3. Need for Process Management

1.4. Health Care Documentation Management
- 1.4.1. Archive Installation
  - 1.4.1.1. Established Conditions
  - 1.4.1.2. Incident Prevention
- 1.4.2. Safety in the Archives
- 1.4.3. Electronic Archive Records
- 1.4.4. Quality Guarantee
- 1.4.5. Closing the Archive

1.5. Quality Control in a Clinical Laboratory
- 1.5.1. Legal Context of Health Care Quality
- 1.5.2. Personnel Functions as a Quality Guarantee
- 1.5.3. Health Inspections
  - 1.5.3.1. Concept
  - 1.5.3.2. Types of Inspections
    - 1.5.3.2.1. Studies
    - 1.5.3.2.2. Facilities
    - 1.5.3.2.3. Processes
- 1.5.4. Clinical Data Audits
  - 1.5.4.1. Concept of an Audit
  - 1.5.4.2. ISO Accreditation
    - 1.5.4.2.1. Laboratory ISO 15189, ISO 17025
    - 1.5.4.2.2. ISO 17020, ISO 22870
  - 1.5.4.3. Certifications

1.6. Evaluation of Analytical Quality: Clinical Indicators
- 1.6.1. System Description
- 1.6.2. Work Flowchart
- 1.6.3. Importance of Quality in the Laboratory
- 1.6.4. Procedure Management in Clinical Analyses
  - 1.6.4.1. Quality Control
  - 1.6.4.2. Extraction and Management of Samples
  - 1.6.4.3. Verification and Validation in the Methods

1.7. Clinical Decision Levels within Reference Ranges.
- 1.7.1. Clinical Laboratory Analysis
  - 1.7.1.1. Concept
  - 1.7.1.2. Standard Clinical Parameters
- 1.7.2. Reference Intervals
  - 1.7.2.1. Laboratory Ranges International Units
  - 1.7.2.2. Analytical Method Validation Guide
- 1.7.3. Clinical Decision Levels
- 1.7.4. Sensitivity and Specificity in Clinical Results
- 1.7.5. Critical Values Variability

1.8. Processing of Requests for Clinical Trials
- 1.8.1. Most Common Types of Requests
- 1.8.2. Efficient Use vs. Excess Demand
- 1.8.3. Practical Example of Requests in the Hospital Field

1.9. Scientific Method in Clinical Analysis
- 1.9.1. PICO Question
- 1.9.2. Protocol
- 1.9.3. Bibliographic Search
- 1.9.4. Study Design
- 1.9.5. Obtaining Results
- 1.9.6. Statistical Analysis and Interpretation of Results
- 1.9.7. Publication of Results

1.10. Medicine Based on Scientific Evidence. Application in Clinical Analysis
- 1.10.1. Concept of Scientific Evidence
- 1.10.2. Classification of the Scientific Evidence Levels
- 1.10.3. Routine Clinical Practice Guidelines
- 1.10.4. Evidence Applied in Clinical Analysis. Magnitude of Benefit

Module 2. Instrumental Techniques in the Clinical Analysis Laboratory

2.1. Instrumental Techniques in Clinical Analysis
- 2.1.1. Introduction
- 2.1.2. Main Concepts
- 2.1.3. Classification of Instrumental Methods
  - 2.1.3.1. Classic Methods
  - 2.1.3.2. Instrumental Methods
- 2.1.4. Preparation of Reagents, Solutions, Buffers and Controls
- 2.1.5. Equipment Calibration
  - 2.1.5.1. Importance of Calibration
  - 2.1.5.2. Methods of Calibration
- 2.1.6. Clinical Analysis Process
  - 2.1.6.1. Reasons for Requesting a Clinical Analysis
  - 2.1.6.2. Phases of the Analysis Process
  - 2.1.6.3. Patient Preparation and Sample Taking

2.2. Microscopic Techniques in Clinical Analysis
- 2.2.1. Introduction and Concepts
- 2.2.2. Types of Microscopes
  - 2.2.2.1. Optical Microscopes
  - 2.2.2.2. Electronic Microscopes
- 2.2.3. Lenses, Light and Image Formation
- 2.2.4. Management and Maintenance of Light Optical Microscopes
  - 2.2.4.1. Handling and Properties
  - 2.2.4.2. Maintenance
  - 2.2.4.3. Observation Incidents
  - 2.2.4.4. Application in Clinical Analysis
- 2.2.5. Other Microscopes Characteristics and Management
  - 2.2.5.1. Dark Field Microscope
  - 2.2.5.2. Polarized Light Microscope
  - 2.2.5.3. Interference Microscope
  - 2.2.5.4. Inverted Microscope
  - 2.2.5.5. Ultraviolet Light Microscope
  - 2.2.5.6. Fluorescence Microscope
  - 2.2.5.7. Electronic Microscope

2.3. Microbiological Techniques in Clinical Analysis
- 2.3.1. Introduction and Concept
- 2.3.2. Design and Work Standards of the Clinical Microbiology Laboratory
  - 2.3.2.1. Necessary Rules and Resources
  - 2.3.2.2. Routines and Procedures in the Laboratory
  - 2.3.2.3. Sterilization and Contamination
- 2.3.3. Cellular Culture Techniques
  - 2.3.3.1. Growth Environment
- 2.3.4. Most Commonly used Extension and Staining Procedures in Clinical Microbiology
  - 2.3.4.1. Bacteria Recognition
  - 2.3.4.2. Cytological
  - 2.3.4.3. Other Procedures
- 2.3.5. Other Methods of Microbiological Analysis
  - 2.3.5.1. Direct Microscopic Examination Identification of Normal and Pathogenic Flora
  - 2.3.5.2. Identification by Biochemical Tests
  - 2.3.5.3. Rapid Immunological Test

2.4. Volumetric, Gravimetric, Electrochemical and Titration Techniques
- 2.4.1. Volumetrics. Introduction and Concept
  - 2.4.1.1. Classification of Methods
  - 2.4.1.2. Laboratory Procedure to Perform a Volumetric Analysis
- 2.4.2. Gravimetry
  - 2.4.2.1. Introduction and Concept
  - 2.4.2.2. Classification of Gravimetric Methods
  - 2.4.2.3. Laboratory Procedure to Perform a Gravimetric Analysis
- 2.4.3. Electrochemical Techniques
  - 2.4.3.1. Introduction and Concept
  - 2.4.3.2. Potentiometry
  - 2.4.3.3. Amperometry
  - 2.4.3.4. Coulometry
  - 2.4.3.5. Conductometry
  - 2.4.3.6. Applications in Clinical Analysis
- 2.4.4. Evaluation
  - 2.4.4.1. Acid Base
  - 2.4.4.2. Precipitation
  - 2.4.4.3. Complex Formation
  - 2.4.4.4. Applications in Clinical Analysis

2.5. Spectral Techniques in Clinical Analysis
- 2.5.1. Introduction and Concepts
  - 2.5.1.1. Electromagnetic Radiation and its Interaction with the Material
  - 2.5.1.2. Radiation Absorption and Emission
- 2.5.2. Spectrophotometry Application in Clinical Analysis
  - 2.5.2.1. Instrumentation
  - 2.5.2.2. Procedure
- 2.5.3. Atomic Absorption Spectrophotometry
- 2.5.4. Flame Emission Photometry
- 2.5.5. Fluorimetry
- 2.5.6. Nephelometry and Turbidimetry
- 2.5.7. Mass and Reflectance Spectrometry
  - 2.5.7.1. Instrumentation
  - 2.5.7.2. Procedure
- 2.5.8. Applications of the Most Common Spectral Techniques Currently Used in Clinical Analysis

2.6. Immunoanalysis Techniques in Clinical Analysis
- 2.6.1. Introduction and Concepts
  - 2.6.1.1. Immunological Concepts
  - 2.6.1.2. Types of Immunoanalysis
  - 2.6.1.3. Cross-Reactivity and Antigen
  - 2.6.1.4. Detection Molecules
  - 2.6.1.5. Quantification and Analytical Sensitivity
- 2.6.2. Immunohistochemical Techniques
  - 2.6.2.1. Concept
  - 2.6.2.2. Immunohistochemical Procedures
- 2.6.3. Enzyme Immunohistochemical Technique
  - 2.6.3.1. Concept and Procedure
- 2.6.4. Immunofluorescence
  - 2.6.4.1. Concept and Classification
  - 2.6.4.2. Immunofluorescence Procedure
- 2.6.5. Other Methods of Immunoanalysis
  - 2.6.5.1. Immunophelometry
  - 2.6.5.2. Radial Immunodiffusion
  - 2.6.5.3. Immunoturbidimetry

2.7. Separation Tehniques in Clinical Analysis. Chromatography and Electrophoresis
- 2.7.1. Introduction and Concepts
- 2.7.2. Chromatographic Techniques
  - 2.7.2.1. Principles, Concepts and Classification
  - 2.7.2.2. Gas-Liquid Chromatography Concepts and Procedure
  - 2.7.2.3. High Efficacy Liquid Chromatography Concepts and Procedure
  - 2.7.2.4. Thin Layer Chromatography
  - 2.7.2.5. Applications in Clinical Analysis
- 2.7.3. Electrophoretic Techniques
  - 2.7.3.1. Introduction and Concepts
  - 2.7.3.2. Instruments and Procedures
  - 2.7.3.3. Purpose and Field of Application in Clinical Analysis
  - 2.7.3.4. Capillary Electrophoresis
    - 2.7.3.4.1. Serum Protein Electrophoresis
- 2.7.4. Hybrid Techniques: ICP Mass Spectrometry, Gas Mass Spectrometry, and Liquid Mass Spectrometry

2.8. Molecular Biology Techniques in Clinical Analysis
- 2.8.1. Introduction and Concepts
- 2.8.2. DNA and RNA Extraction Techniques
  - 2.8.2.1. Procedure and Conservation
- 2.8.3. Chain Reaction of PCR Polymers
  - 2.8.3.1. Concept and Foundation
  - 2.8.3.2. Instruments and Procedures
  - 2.8.3.3. Modifications of the PCR Method
- 2.8.4. Hybridization Techniques
- 2.8.5. Sequencing
- 2.8.6. Protein Analysis by Western Blotting
- 2.8.7. Proteomics and Genomics
  - 2.8.7.1. Concepts and Procedures in Clinical Analysis
  - 2.8.7.2. Types of Proteomic Studies
  - 2.8.7.3. Bioinformation and Proteomic
  - 2.8.7.4. Metabolomics
  - 2.8.7.5. Relevance in Biomedicine

2.9. Techniques for the Determination of Form Elements Flow Cytometry Bedside Testing
- 2.9.1. Red Blood Cells Count
  - 2.9.1.1. Cellular Count Procedure
  - 2.9.1.2. Pathologies Diagnosed with this Methodology
- 2.9.2. Leukocyte Count
  - 2.9.2.1. Procedure
  - 2.9.2.2. Pathologies Diagnosed with this Methodology
- 2.9.3. Flow Cytometry
  - 2.9.3.1. Introduction and Concepts
  - 2.9.3.2. Technique Procedure
  - 2.9.3.3. Cytometry Applications in Clinical Analysis
    - 2.9.3.3.1. Applications in Oncohematology
    - 2.9.3.3.2. Applications in Allergies
    - 2.9.3.3.3. Applications in Infertility
- 2.9.4. Bedside Testing
  - 2.9.4.1. Concept
  - 2.9.4.2. Types of Samples
  - 2.9.4.3. Techniques Used
  - 2.9.4.4. Most Common Applications of Point-of-Care Testing

2.10. Interpretation of Results, Analytical Method Evaluation and Analytical Interferences
- 2.10.1. Laboratory Report
  - 2.10.1.1. Concept
  - 2.10.1.2. Characteristic Elements of a Laboratory Report
  - 2.10.1.3. Interpretation of the Report
- 2.10.2. Evaluation of Analytical Methods in Clinical Analysis
  - 2.10.2.1. Concepts and Objectives
  - 2.10.2.2. Linearity
  - 2.10.2.3. Truthfulness
  - 2.10.2.4. Precision
- 2.10.3. Analytical Interferences
  - 2.10.3.1. Concept, Foundation and Classification
  - 2.10.3.2. Endogenous Interferents
  - 2.10.3.3. Exogenous Interferents
  - 2.10.3.4. Procedures for Detecting and Quantifying an Interference in a Specific Method or Analysis

Module 3. Biochemistry I

3.1. Biochemical and Molecular Base of Diseases
- 3.1.1. Genetic Alterations
- 3.1.2. Cell Signaling Alterations
- 3.1.3. Metabolism Alterations

3.2. Metabolism of Nutrients
- 3.2.1. Concept of Metabolism
- 3.2.2. Biochemical Phases of Nutrition: Digestion, Transport, Metabolism and Excretion
- 3.2.3. Clinical Laboratory in the Study of Alterations in Digestion, Absoprtion and Metabolism of Nutrients

3.3. Biochemical Study of Vitamins and Vitamin Deficiency
- 3.3.1. Liposoluble Vitamins
- 3.3.2. Hydrosoluble Vitamins
- 3.3.3. Vitamin Deficiencies

3.4. Biochemical Study of Protein Alterations and Nitrogen Compounds
- 3.4.1. Plasmatic Proteins
- 3.4.2. Clinical Enzymology
- 3.4.3. Evaluation of Biochemical Markers in Renal Function

3.5. Biochemical Study of Carbohydrate Metabolism Regulation and its Pathophysiological Alterations
- 3.5.1. Hypoglycemia
- 3.5.2. Hyperglycemia
- 3.5.3. Diabetes Mellitus: Diagnosis and Monitoring in a Clinical Laboratory

3.6. Biochemical Study of the Pathophysiological Alterations of Lipids and Plasma Lipoproteins
- 3.6.1. Lipoproteins
- 3.6.2. Primary Dyslipidemia
- 3.6.3. Hyperlipoproteinemia
- 3.6.4. Sphingolipidosis

3.7. Biochemistry of Blood in a Chemical Laboratory
- 3.7.1. Blood Hemostasis
- 3.7.2. Coagulation and Fibrinolysis
- 3.7.3. Biochemical Analysis of Iron Metabolism

3.8. Mineral Metabolism and its Clinical Alterations
- 3.8.1. Calcium Homeostasis
- 3.8.2. Phosphorus Homeostasis
- 3.8.3. Magnesium Homeostasis
- 3.8.4. Biochemical Markers of Bone Remodeling

3.9. Acid-Base Balance and Peripheral Blood Gas Study
- 3.9.1. Acid-Base Balance
- 3.9.2. Peripheral Blood Gasometry
- 3.9.3. Gasometry Markers

3.10. Hydroelectrolyte Balance and its Alterations
- 3.10.1. Sodium
- 3.10.2. Potassium
- 3.10.3. Chlorine

Module 4. Biochemistry II

4.1. Congenital Alterations of Carbohydrate Metabolism
- 4.1.1. Alterations in the Digestion and Intestinal Absorption of Carbohydrates
- 4.1.2. Galactose Metabolism Alterations
- 4.1.3. Fructose Metabolism Alterations
- 4.1.4. Glucogen Metabolism Alterations
  - 4.1.4.1. Glucogenesis: Types

4.2. Congenital Alterations of Amino Acid Metabolism
- 4.2.1. Aromatic Amino Acid Metabolism Alterations
  - 4.2.1.1. Phenylketonuria.
  - 4.2.1.2. Glutaric Aciduria Type 1
- 4.2.2. Alterations of Branched Amino Acid Metabolism
  - 4.2.2.1. Maple Syrup Urine Disease
  - 4.2.2.2. Isovaleric Acidemia
- 4.2.3. Alterations in the Metabolism of Sulfur Amino Acids
  - 4.2.3.1. Homocysturia

4.3. Congenital Alterations of Lipid Metabolism
- 4.3.1. Beta-Oxidation of Fatty Acids
  - 4.3.1.1. Introduction to Beta-Oxidation of Fatty Acids
  - 4.3.1.2. Fatty Acid Beta-Oxidation Alterations
- 4.3.2. Carnitine Cycle
  - 4.3.2.1. Introduction to Carnitine Cycle
  - 4.3.2.2. Carnitine Cycle Alterations

4.4. Urea Cycle Disorders
- 4.4.1. Urea Cycle
- 4.4.2. Genetic Alterations of the Urea Cycle
  - 4.4.2.1. Ornithine Transcarbamylase (OTC) Deficiency
  - 4.4.2.2. Other Urea Cycle Disorders
- 4.4.3. Diagnosis and Treatment of Urea Cycle Diseases

4.5. Molecular Pathologies of Nucleotide Bases Alterations of Purine and Pyrimidine Metabolism
- 4.5.1. Introduction to Purine and Pyrimidine Metabolism
- 4.5.2. Purine Metabolism Disorders
- 4.5.3. Pyrimidine Metabolism Disorders.
- 4.5.4. Diagnosis of Purine and Pyrimidine Disorders

4.6. Porphyrias. Alterations in the Synthesis of the Heme Group
- 4.6.1. Heme Group Synthesis
- 4.6.2. Porphyrias: Types
  - 4.6.2.1. Liver Porphyrias
    - 4.6.2.1.1. Acute Porphyrias
  - 4.6.2.2. Hematopoietic Porphyrias
- 4.6.3. Diagnosis and Treatment of Porphyrias

4.7. Jaundice. Bilirubin Metabolism Disorders
- 4.7.1. Introduction to Bilirubin Metabolism
- 4.7.2. Congenital Jaundice
  - 4.7.2.1. Unconjugated hyperbilirubinaemia
  - 4.7.2.2. Unconjugated hyperbilirubinaemia
- 4.7.3. Diagnosis and Treatment of Jaundice

4.8. Oxidative Phosphorylation
- 4.8.1. Mitochondria
  - 4.8.1.1. Mitochondrial Enzyme and Protein Constituents
- 4.8.2. Electronic Transport Chain
  - 4.8.2.1. Electronic Transporters
  - 4.8.2.2. Electronic Complexes
- 4.8.3. Coupling of Electronic Transport to ATP Synthesis
  - 4.8.3.1. ATP Synthase
  - 4.8.3.2. Oxidative Phosphorylation Uncoupling Agents
- 4.8.4. NADH Shuttle

4.9. Mitochondrial Disorders
- 4.9.1. Maternal Inheritance
- 4.9.2. Heteroplasmy and Homoplasmy
- 4.9.3. Mitochondrial Diseases
  - 4.9.3.1. Leber Hereditary Optic Neuropathy
  - 4.9.3.2. Leigh Disease
  - 4.9.3.3. MELAS Syndrome
  - 4.9.3.4. Myoclonic Epilepsy with Ragged Red Fibers (MERRF)
- 4.9.4. Diagnosis and Treatment of Mitochondrial Diseases

4.10. Other Disorders Produced by Alterations in Other Organelles
- 4.10.1. Lysosomes
  - 4.10.1.1. Lysosomal Diseases
    - 4.10.1.1.1. Sphingolipidosis
    - 4.10.1.1.2. Mucopolysaccharidosis
- 4.10.2. Peroxisomes
  - 4.10.2.1. Lysosomal Diseases
    - 4.10.2.1.1. Zellweger Syndrome
- 4.10.3. Golgi Apparatus
  - 4.10.3.1. Golgi Apparatus Diseases
    - 4.10.3.1.1. Mucolipidosis II

Module 5. Biochemistry III

5.1. Study of Motor Function
- 5.1.1. Overview of Motor Function and Osteoarticular System
- 5.1.2. Alterations of Motor Function
- 5.1.3. Diagnosis of Alterations of Motor Function
  - 5.1.3.1. Diagnostic Techniques
  - 5.1.3.2. Molecular Markers

5.2. Study of Cardiac Function
- 5.2.1. Overview of Cardiac Function
- 5.2.2. Alterations of Cardiac Function
- 5.2.3. Diagnosis of Alterations of Cardiac Function
  - 5.2.3.1. Diagnostic Techniques
  - 5.2.3.2. Molecular Markers

5.3. Study of Renal Function
- 5.3.1. Overview of Renal Function
- 5.3.2. Alterations of Renal Function
- 5.3.3. Diagnosis of Alterations of Renal Function
  - 5.3.3.1. Diagnostic Techniques
  - 5.3.3.2. Molecular Markers

5.4. Study of Liver Function
- 5.4.1. Overview of Liver Function
- 5.4.2. Alterations of Liver Function
- 5.4.3. Diagnosis of Alterations of Liver Function
  - 5.4.3.1. Diagnostic Techniques
  - 5.4.3.2. Molecular Markers

5.5. Study of Neurological Function
- 5.5.1. Overview of Neurological Function
- 5.5.2. Alterations in Neurological Function (Neurodegenerative Diseases)
- 5.5.3. Diagnosis of Alterations of Neurological Function
  - 5.5.3.1. Diagnostic Techniques
  - 5.5.3.2. Molecular Markers

5.6. Study of Hypothalamic and Pituitary Functions
- 5.6.1. Overview of Hypothalamic and Pituitary Functions
- 5.6.2. Alterations in Hypothalamic and Pituitary Functions
- 5.6.3. Diagnosis of Alterations in Hypothalamic and Pituatry Functions
  - 5.6.3.1. Diagnostic Techniques
  - 5.6.3.2. Molecular Markers

5.7. Study of Pancreatic Function
- 5.7.1. Overview of Pancreatic Function
- 5.7.2. Alterations of Pancreatic Function
- 5.7.3. Diagnosis of Alterations in Pancreatic Function
  - 5.7.3.1. Diagnostic Techniques
  - 5.7.3.2. Molecular Markers

5.8. Study of Thyroid and Parathyroid Function
- 5.8.1. Overview of Thyroid and Parathyroid Functions
- 5.8.2. Alterations of Thyroid and Parathyroid Function
- 5.8.3. Diagnosis of Alterations in Thyroid and Parathyroid Functions
  - 5.8.3.1. Diagnostic Techniques
  - 5.8.3.2. Molecular Markers

5.9. Study of Adrenal Gland Function
- 5.9.1. Overview of Adrenal Gland Function
- 5.9.2. Alterations of Adrenal Gland Function
- 5.9.3. Diagnosis of Alterations in Adrenal Gland Function
  - 5.9.3.1. Diagnostic Techniques
  - 5.9.3.2. Molecular Markers

5.10. Study of Gonad Function
- 5.10.1. Overview of Gonad Function
- 5.10.2. Alterations of Gonad Function
- 5.10.3. Diagnosis of Alterations in Gonad Function
  - 5.10.3.1. Diagnostic Techniques
  - 5.10.3.2. Molecular Markers

Module 6. Biochemistry IV

6.1. Study of Human Fertility and Infertility
- 6.1.1. Most Frequent Gynecological Problems
  - 6.1.1.1. Reproductive System Abnormalities
  - 6.1.1.2. Endometriosis
  - 6.1.1.3. Polycystic Ovaries
  - 6.1.1.4. FSH Serum Concentration
- 6.1.2. Most Common Andrological Problems
  - 6.1.2.1. Seminal Quality Alteration
  - 6.1.2.2. Retrograde Ejaculation
  - 6.1.2.3. Neurological Lesions
  - 6.1.2.4. FSH Concentration

6.2. Current Assisted Reproduction Techniques
- 6.2.1. Artificial Insemination
- 6.2.2. IUI-H
- 6.2.3. IUI-D
- 6.2.4. Ovarian Puncture
- 6.2.5. In Vitro Fertilization and Intracytoplasmic Sperm Injection
- 6.2.6. Gamete Transfer

6.3. Techniques for Gamete Conservation in a Urology Laboratory Gamete Donation Bank
- 6.3.1. Current Legal Framework
- 6.3.2. Principles of Cell Cryopreservation
- 6.3.3. Oocyte Freezing/Thawing Protocol
- 6.3.4. Semen Freezing/Thawing Protocol
- 6.3.5. Gamete Donation Bank
  - 6.3.5.1. Concept and Purpose of Assisted Reproduction
  - 6.3.5.2. Donor Characteristics

6.4. Study of Embriology and Andrology in the Clinical Laboratory
- 6.4.1. Pre-embryo and Sperm Culture
- 6.4.2. Embryo Stages
- 6.4.3. Seminal Study Techniques
  - 6.4.3.1. Seminogram
  - 6.4.3.2. Seminal Lavage

6.5. Laboratory Techniques for the Study of Cell Growth, Senescence and Apoptosis
- 6.5.1. Study of Cell Growth
  - 6.5.1.1. Concept
  - 6.5.1.2. Conditioning Parameters of Cell Growth
    - 6.5.1.2.1. Feasibility
    - 6.5.1.2.2. Multiplication
    - 6.5.1.2.3. Temperature
    - 6.5.1.2.4. External Agents
  - 6.5.1.3. Practical Applications in Clinical Analysis
- 6.5.2. Study of Cellular Senescence and Apoptosis
  - 6.5.2.1. Concept of Senescence
  - 6.5.2.2. Hematoxylin/Eosin Staining
  - 6.5.2.3. Clinical Application of Oxidative Stress

6.6. Analysis of Body Fluids
- 6.6.1. Amniotic Fluid
- 6.6.2. Saliva Nasopharynx
- 6.6.3. LCR
- 6.6.4. Synovial Fluid
- 6.6.5. Pleural
- 6.6.6. Pericardial
- 6.6.7. Peritoneal

6.7. Urine Study in the Urology and Pathological Anatomy Laboratory
- 6.7.1. Systematic Uroanalysis
- 6.7.2. Urine culture
- 6.7.3. Pathological Anatomy Cytology

6.8. Clinical Study of Stools
- 6.8.1. Physical Study
- 6.8.2. Hidden Blood in Stools
- 6.8.3. Fresh Study
- 6.8.4. Stool Culture

6.9. Molecular Study of Cancer. Most Common Tumor Markers
- 6.9.1. PSA
- 6.9.2. EGFR
- 6.9.3. HER2 Gene
- 6.9.4. CD20
- 6.9.5. Neuron-Specific Enolase NSE
- 6.9.6. FAP
- 6.9.7. ALK Gene
- 6.9.8. ROS1 Gene
- 6.9.9. BRAF V600e Mutation

6.10. Therapeutic Drug Monitoring Pharmacogenetics
- 6.10.1. Concept
- 6.10.2. Study Parameters
  - 6.10.2.1. Absorption
  - 6.10.2.2. Distribution
  - 6.10.2.3. Elimination
- 6.10.3. Aplicaciones clínicas de la farmacocinética

Module 7. Hematology

7.1. Introduction to the Hematopoietic System and Study Techniques
- 7.1.1. Classification of Blood Cells and Hematopoiesis
- 7.1.2. Hemacytometry and Blood Smear Study
- 7.1.3. Bone Marrow Study
- 7.1.4. Role of the Pathologist in the Diagnosis of Testicular Neoplasms
- 7.1.5. Role of Immunophenotyping in the Diagnosis of Hematologic Disorders

7.2. Diagnosis of Erythrocyte Disorders. Anemias, Erythrocytosis, Hemoglobinopathies, and Thalassemias
- 7.2.1. Classification of the Types of Anemia
  - 7.2.1.1. Etiopathogenic Classification
  - 7.2.1.2. Classification According to VCM
    - 7.2.1.2.1. Microcytic Anemia
    - 7.2.1.2.2. Normocytic Anemia
    - 7.2.1.2.3. Macrocytic Anemia
- 7.2.2. Erythrocytosis. Differential Diagnosis
  - 7.2.2.1. Primary Erythrocytosis
  - 7.2.2.2. Secondary Erythrocytosis
- 7.2.3. Hemoglobinopathies and Thalassemias
  - 7.2.3.1. Classification
  - 7.2.3.2. Laboratory Diagnosis

7.3. Quantitative Alterations of the White Series
- 7.3.1. Neutrophils: Neutropenia and Neutrophilia
- 7.3.2. Lymphocytes: Lymphopenia and Lymphocytosis

7.4. Diagnosis of Platelet Disorders
- 7.4.1. Morphological Alterations: Thrombocytopathies
- 7.4.2. Thrombocytopenia. Diagnostic Approach

7.5. Myeloproliferative and Myelodysplastic Syndromes
- 7.5.1. Laboratory Findings and Complementary Examinations
  - 7.5.1.1. Hemogram and Peripheral Blood Smear
  - 7.5.1.2. Bone Marrow Study
    - 7.5.1.2.1. Bone Marrow Morphology
    - 7.5.1.2.2. Flow Cytometry
    - 7.5.1.2.3. Cytogenetics
    - 7.5.1.2.4. Molecular Biology
- 7.5.2. Diagnosis Classification Differential Diagnosis

7.6. Monoclonal Gammopathies. Multiple Myeloma
- 7.6.1. Study of Monoclonal Gammopathies
  - 7.6.1.1. Bone Marrow Morphology
  - 7.6.1.2. Study of the Monoclonal Component
  - 7.6.1.3. Other Laboratory Studies
- 7.6.2. Classification of Monoclonal Gammopathies. Differential Diagnosis
  - 7.6.2.1. Monoclonal Gammopathy of Uncertain Significance and Quiescent Myeloma
  - 7.6.2.2. Multiple Myeloma
    - 7.6.2.2.1. Diagnostic Criteria
  - 7.6.2.3. Amyloidosis
  - 7.6.2.4. Waldenström's Macroglobulinemia

7.7. Differential Diagnosis of Acute Leukemia
- 7.7.1. Acute Myeloid Leukemia. Promyelocytic Leukemia
  - 7.7.1.1. Laboratory Findings and Complementary Examinations
  - 7.7.1.2. Hemogram and Peripheral Blood Smear
  - 7.7.1.3. Bone Marrow Study
    - 7.7.1.3.1. Bone Marrow Morphology
    - 7.7.1.3.2. Flow Cytometry
    - 7.7.1.3.3. Cytogenetics
    - 7.7.1.3.4. Molecular Biology
  - 7.7.1.4. Diagnosis Classification
- 7.7.2. Acute Lymphoid Leukemia
  - 7.7.2.1. Laboratory Findings and Complementary Examinations
  - 7.7.2.2. Hemogram and Peripheral Blood Smear
  - 7.7.2.3. Bone Marrow Study
    - 7.7.2.3.1. Bone Marrow Morphology
    - 7.7.2.3.2. Flow Cytometry
    - 7.7.2.3.3. Cytogenetics
    - 7.7.2.3.4. Molecular Biology
  - 7.7.2.4. Diagnosis Classification

7.8. Mature B and T Lymphoid Neoplasms
- 7.8.1. Chronic B Lymphoproliferative Syndromes. Chronic Lymphocytic Leukemia
  - 7.8.1.1. Laboratory Studies and Differential Diagnosis
    - 7.8.1.1.1. Chronic Lymphocytic Leukemia
    - 7.8.1.1.2. Tricholeukaemia
    - 7.8.1.1.3. Splenic Marginal Zone Lymphoma
    - 7.8.1.1.4. Prolymphocytic Leukemia
    - 7.8.1.1.5. Leukemia of Granular Lymphocytes
- 7.8.2. Non-Hodgkin's Lymphomas
  - 7.8.2.1. Initial Study and Diagnosis
  - 7.8.2.2. Classification of Lymphoid Neoplasms
    - 7.8.2.2.1. Follicular Lymphoma
    - 7.8.2.2.2. Mantle Cell Lymphoma
    - 7.8.2.2.3. Diffuse Large B-Cell Lymphoma
    - 7.8.2.2.4. MALT Lymphoma
    - 7.8.2.2.5. Burkitt Lymphoma
    - 7.8.2.2.6. Peripheral T-Cell Lymphomas
    - 7.8.2.2.7. Cutaneous Lymphomas
    - 7.8.2.2.8. Other
- 7.8.3. Hodgkin's Lymphomas
  - 7.8.3.1. Complementary Tests
  - 7.8.3.2. Histological Classification

7.9. Diagnosis of Coagulation Disorders
- 7.9.1. Study of Hemorrhagic Diatheses
  - 7.9.1.1. Initial Tests
  - 7.9.1.2. Specific Studies
- 7.9.2. Congenital Coagulation Disorders
  - 7.9.2.1. Hemophilia A and B
  - 7.9.2.2. Von Willebrand Disease
  - 7.9.2.3. Other Congenital Coagulopathies
- 7.9.3. Acquired Coagulation Disorders
- 7.9.4. Thrombosis and Thrombophilia. Antiphospholipid Syndrome
- 7.9.5. Monitoring of Antocoagulant Therapy

7.10. Introduction to Hemotherapy
- 7.10.1. Blood Groups
- 7.10.2. Blood Components
- 7.10.3. Recommendations for the Use of Blood Derivatives
- 7.10.4. Most Common Transfusional Reactions

Module 8. Microbiology and Parasitology

8.1. General Concepts of Microbiology
- 8.1.1. Structure of Microorganisms
- 8.1.2. Nutrition, Metabolism and Microbial Growth
- 8.1.3. Microbial Taxonomy
- 8.1.4. Microbial Genomes and Genetics

8.2. Study of Infectious Bacteria
- 8.2.1. Gram Positive Cocci
- 8.2.2. Gram Negative Cocci
- 8.2.3. Gram Positive Bacilli
- 8.2.4. Gram Negative Bacilli
- 8.2.5. Other Bacteria of Clinical Interest
  - 8.2.5.1. *Legionella Pneumophila*
  - 8.2.5.2. Mycobacteria

8.3. General Techniques in Microbiology
- 8.3.1. Processing of Microbiological Samples
- 8.3.2. Types of Microbiological Samples
- 8.3.3. Planting Techniques
- 8.3.4. Types of Staining in Microbiology
- 8.3.5. Current Microorganism Identification Techniques
  - 8.3.5.1. Biochemical Tests
  - 8.3.5.2. Manual or Automatic Commercial Systems and Multitest Galleries
  - 8.3.5.3. MALDI TOF Mass Spectrometry
  - 8.3.5.4. Molecular Tests
    - 8.3.5.4.1. 16S rRNA
    - 8.3.5.4.2. 16S-23S rRNA
    - 8.3.5.4.3. 23S rRNA
    - 8.3.5.4.4. rpoB Gene
    - 8.3.5.4.5. gyrB Gene
  - 8.3.5.5. Serological Diagnosis of Microbial Infections

8.4. Antimicrobial Sensitivity Tests
- 8.4.1. Antimicrobial Resistance Mechanisms
- 8.4.2. Sensitivity Test
- 8.4.3. Antibacterials

8.5. Study of Viral Infections
- 8.5.1. Basic Principles of Virology
- 8.5.2. Taxonomy
- 8.5.3. Viruses Affecting the Respiratory System
- 8.5.4. Viruses Affecting the Digestive System
- 8.5.5. Viruses Affecting the Central Nervous System
- 8.5.6. Viruses Affecting the Reproductive System
- 8.5.7. Systemic Viruses

8.6. General Techniques in Virology
- 8.6.1. Processing of Samples
- 8.6.2. Laboratory Techniques for Viral Diagnosis
- 8.6.3. Antivirals

8.7. Most Common Fungal Infections
- 8.7.1. General Information on Fungi
- 8.7.2. Taxonomy
- 8.7.3. Primary Mycoses
- 8.7.4. Opportunist Mycoses
- 8.7.5. Subcutaneous Mycoses
- 8.7.6. Cutaneous and Superficial Mycoses
- 8.7.7. Mycosis of Atypical Etiology

8.8. Diagnostic Techniques in a Clinical Mycology
- 8.8.1. Processing of Samples
- 8.8.2. Study of Superficial Mycoses
- 8.8.3. Study of Subcutaneous Mycoses
- 8.8.4. Study of Deep Mycoses
- 8.8.5. Study of Opportunist Mycoses
- 8.8.6. Diagnostic Techniques
- 8.8.7. Antifungal

8.9. Parasitic Diseases
- 8.9.1. General Concepts of Parasitology
- 8.9.2. Protozoa
  - 8.9.2.1. Amoeba (Sarcodina)
  - 8.9.2.2. Ciliates (Ciliophora)
  - 8.9.2.3. Flagellates (Mastigophora)
  - 8.9.2.4. Apicomplexa
  - 8.9.2.5. Plasmodium
  - 8.9.2.6. Sarcocystis
  - 8.9.2.7. Microsporidios
- 8.9.3. Helminths
  - 8.9.3.1. Nematodes
  - 8.9.3.2. Platyhelminthes
    - 8.9.3.2.1. Cestodes
    - 8.9.3.2.2. Trematodes
- 8.9.4. Arthropods

8.10. Diagnostic Techniques in a Clinical Parasitology
- 8.10.1. Processing of Samples
- 8.10.2. Diagnostic Methods
- 8.10.3. Antiparasitic Agents

Module 9. Immunology

9.1. Immune System Organs
- 9.1.1. Primary Lymphoid Organs
  - 9.1.1.1. Fetal Liver
  - 9.1.1.2. Bone Marrow
  - 9.1.1.3. Thymus
- 9.1.2. Secondary Lymphoid Organs
  - 9.1.2.1. Bladder
  - 9.1.2.2. Lymph Nodes
  - 9.1.2.3. Mucosal-Associated Lymphoid Tissue
- 9.1.3. Tertiary Lymphoid Organs
- 9.1.4. Lymphatic System

9.2. Immune System Cells
- 9.2.1. Granulocytes
  - 9.2.1.1. Neutrophils
  - 9.2.1.2. Eosinophils
  - 9.2.1.3. Basophils
- 9.2.2. Monocytes and Macrophages
- 9.2.3. Lymphocytes
  - 9.2.3.1. T Lymphocytes
  - 9.2.3.2. B Lymphocytes
- 9.2.4. Natural Killer Cells
- 9.2.5. Antigen Presenting Cells

9.3. Antigens and Immunoglobulins
- 9.3.1. Antigenicity and Immunogenicity
  - 9.3.1.1. Antigen
  - 9.3.1.2. Immunogen
  - 9.3.1.3. Epitopes
  - 9.3.1.4. Haptenos and Carriers
- 9.3.2. Immunoglobulins
  - 9.3.2.1. Structure and Function
  - 9.3.2.2. Classification of Immunoglobulins
  - 9.3.2.3. Somatic Hypermutation and Isotype Shift

9.4. Complement System
- 9.4.1. Functions
- 9.4.2. Activation Routes
  - 9.4.2.1. Classical Pathway
  - 9.4.2.2. Alternative Pathway
  - 9.4.2.3. Lectin Pathway
- 9.4.3. Complement Receptors
- 9.4.4. Complements and Inflammation
- 9.4.5. Complement Cascade

9.5. Major Histocompatibility Complex
- 9.5.1. Major and Minor Histocompatibility Antigens
- 9.5.2. HLA Genetics
- 9.5.3. HLA and Disease
- 9.5.4. Transplant Immunology

9.6. Immune Response
- 9.6.1. Innate and Adaptive Immune Response
- 9.6.2. Humoral Immune Response
  - 9.6.2.1. Primary Response
  - 9.6.2.2. Secondary Response
- 9.6.3. Cellular Immune Response

9.7. Autoimmune Diseases
- 9.7.1. Immunogenic Tolerance
- 9.7.2. Autoimmunity
- 9.7.3. Autoimmune Diseases
- 9.7.4. Study of Autoimmune Diseases

9.8. Immunodeficiencies
- 9.8.1. Primary Immunodeficiencies
- 9.8.2. Secondary Immunodeficiencies
- 9.8.3. Antitumor Immunity
- 9.8.4. Evaluation of Immunity

9.9. Hypersensitivity Reactions
- 9.9.1. Classification of Hypersensitivity Reactions
- 9.9.2. Type I Hypersensitivity or Allergic Reactions
- 9.9.3. Anaphylaxis
- 9.9.4. Allergological Diagnostic Methods

9.10. Immunoanalytical Techniques
- 9.10.1. Precipitation and Agglutination Techniques
- 9.10.2. Complement Fixation Techniques
- 9.10.3. ELISA Techniques
- 9.10.4. Immunochromatography Techniques
- 9.10.5. Radioimmunoanalysis Techniques
- 9.10.6. Isolation of Lymphocytes
- 9.10.7. Microlymphocytotoxicity Technique
- 9.10.8. Mixed Lymphocyte Culture
- 9.10.9. Flow Cytometry Applied to Immunology
- 9.10.10. Flow Cytometry

Module 10. Genetics

10.1. Introduction to Genetic Medicine Genealogies and Inheritance Patterns
- 10.1.1. Historical Development of Genetics Key Concepts
- 10.1.2. Structure of Genes and Regulation of Genetic Expression Epigenetics
- 10.1.3. Genetic Variability. Mutation and Reparation of DNA
- 10.1.4. Human Genetics. Organization of the Human Genome
- 10.1.5. Genetic Diseases. Morbidity and Mortality
- 10.1.6. Human Inheritance. Concept of Genotype and Phenotype
  - 10.1.6.1. Mendelian Inheritance Patterns
  - 10.1.6.2. Multigene and Mitochondrial Inheritance
- 10.1.7. Construction of Genealogies
  - 10.1.7.1. Allele, Genotypic and Phenotypic Frequency Estimation
  - 10.1.7.2. Segregation Analysis
- 10.1.8. Other Factors which Affect the Phenotype

10.2. Molecular Biology Techniques Used in Genetics
- 10.2.1. Genetics and Molecular Diagnostics
- 10.2.2. Polymerase Chain Reaction (PCR) Applied to Diagnosis and Research in Genetics
  - 10.2.2.1. Detection and Amplification of Specific Sequences
  - 10.2.2.2. Quantification of Nucleic Acids (RT-PCR)
- 10.2.3. Cloning Techniques: Isolation, Restriction and Ligation of DNA Fragments
- 10.2.4. Detection of Mutations and Measurement of Genetic Variability: RFLP, VNTR, SNPs
- 10.2.5. Mass Sequencing Techniques. NGS
- 10.2.6. Transgenesis Genetic Therapy
- 10.2.7. Cytogenetic Techniques
  - 10.2.7.1. Chromosome Banding
  - 10.2.7.2. FISH, CGH

10.3. Human Cytogenetics Numerical and Structural Chromosomal Abnormalities
- 10.3.1. Study of Human Cytogenetics Characteristics
- 10.3.2. Chromosome Characterization and Cytogenetic Nomenclature
  - 10.3.2.1. Chromosomal Analysis: Karyotype
- 10.3.3. Anamolies in the Number of Chromosones
  - 10.3.3.1. Polyploidies
  - 10.3.3.2. Aneuploidies
- 10.3.4. Structural Chromosomal Alterations Genetic Dosis
  - 10.3.4.1. Deletions
  - 10.3.4.2. Duplications
  - 10.3.4.3. Inversions
  - 10.3.4.4. Translocations
- 10.3.5. Chromosomal Polymorphisms
- 10.3.6. Genetic Imprinting

10.4. Prenatal Diagnosis of Genetic Alterations and Congenital Defects Preimplantational Genetic Diagnosis
- 10.4.1. Prenatal Diagnosis. What Does it Entail?
- 10.4.2. Incidence of Congenital Defects
- 10.4.3. Indications for Performing Prenatal Diagnosis
- 10.4.4. Prenatal Diagnostic Methods
  - 10.4.4.1. Non-Invasive Procedures: First and Second Trimester Screening TPNI
  - 10.4.4.2. Invasive Procedures: Amniocentesis, Cordocentesis and Chorionic Biopsy
- 10.4.5. Preimplantational Genetic Diagnosis Indications
- 10.4.6. Embryo Biopsy and Genetic Analysis

10.5. Genetic Diseases I
- 10.5.1. Diseases with Autosomal Dominant Inheritance
  - 10.5.1.1. Achondroplasia
  - 10.5.1.2. Huntington's Disease
  - 10.5.1.3. Retinoblastoma
  - 10.5.1.4. Charcot-Marie-Tooth Disease
- 10.5.2. Diseases with Autosomal Recessive Inheritance
  - 10.5.2.1. Phenylketonuria.
  - 10.5.2.2. Sickle Cell Anemia
  - 10.5.2.3. Cystic Fibrosis
  - 10.5.2.4. Laron Syndrome
- 10.5.3. Sex-linked Inherited Diseases
  - 10.5.3.1. Rett Sydrome
  - 10.5.3.2. Haemophilia
  - 10.5.3.3. Duchenne Muscular Dystrophy

10.6. Genetic Diseases II
- 10.6.1. Mitochondrial Inheritance Diseases
  - 10.6.1.1. Mitochondrial Encephalomyopathies
  - 10.6.1.2. Leber Hereditary Optic Neuropathy (NOHL)
- 10.6.2. Genetic Anticipation Phenomena
  - 10.6.2.1. Huntington's Disease
  - 10.6.2.2. Fragile X Syndrome
  - 10.6.2.3. Spinocerebellar Ataxias
- 10.6.3. Allelic Heterogeneity
  - 10.6.3.1. Usher Syndrome

10.7. Complex Diseases Genetics. Molecular Bases of Sporadic and Familial Cancer
- 10.7.1. Multifactorial Inheritance
  - 10.7.1.1. Polygeny
- 10.7.2. Contribution of Environmental Factors to Complex Diseases
- 10.7.3. Quantative Genetics
  - 10.7.3.1. Heritability
- 10.7.4. Common Complex Diseases
  - 10.7.4.1. Diabetes Mellitus
  - 10.7.4.2. Alzheimer's Disease
- 10.7.5. Behavioral Disorders and Personality Traits: Alcoholism, Autism, and Schizophrenia
- 10.7.6. Cancer: Molecular Base and Environmental Factors
  - 10.7.6.1. Genetics of Cell Proliferation and Differentiation Processes Cellular Cycle
  - 10.7.6.2. DNA Reparation Genes, Oncogenes and Tumor Suppresor Genes
  - 10.7.6.3. Environmental Influence on the Development of Cancer
- 10.7.7. Familial Cancer

10.8. Genomics and Proteomics
- 10.8.1. Omic Sciences and their Usefulness in Medicine
- 10.8.2. Genome Sequencing and Analysis
  - 10.8.2.1. DNA Libraries
- 10.8.3. Comparative Genomics
  - 10.8.3.1. Organisms Model
  - 10.8.3.2. Sequencing Comparison
  - 10.8.3.3. Human Genome Project
- 10.8.4. Functional Genomics
  - 10.8.4.1. Transcriptomics
  - 10.8.4.2. Structural and Functional Organization of the Genome
  - 10.8.4.3. Functional Genomic Elements
- 10.8.5. From the Genome to the Proteome
  - 10.8.5.1. Post-Translational Modifications
- 10.8.6. Strategies for the Separation and Purification of Proteins
- 10.8.7. Identification of Proteins
- 10.8.8. Interactom

10.9. Genetic Assessment Ethical and Legal Aspects of Diagnosis and Research in Genetics
- 10.9.1. Genetic Assessment Concepts and Base Techniques
  - 10.9.1.1. Risk of Recurrence of Genetically-Based Diseases
  - 10.9.1.2. Genetic Assessment in Prenatal Diagnosis
  - 10.9.1.3. Ethical Principles in Genetic Assessment
- 10.9.2. Legislation of New Genetic Technology
  - 10.9.2.1. Genetic Engineering
  - 10.9.2.2. Human Cloning
  - 10.9.2.3. Genetic Therapy
- 10.9.3. Bioethics and Genetics

10.10. Biobanks and Bioinformatics Tools
- 10.10.1. Biobanks Concept and Functions
- 10.10.2. Organization, Managament and Quality of Biobanks
- 10.10.3. Computational Biology
- 10.10.4. *Big Data* and *Machine Learning*
- 10.10.5. Bioinformatics Applications in Biomedicine
  - 10.10.5.1. Sequences Analysis
  - 10.10.5.2. Image Analysis
  - 10.10.5.3. Personalized and Precision Medicine

04

Teaching Objectives

The focus of this university program is designed to enhance essential skills in optimizing Clinical Analysis processes. Through knowledge of international standards, quality and safety management in the handling of biological samples will be optimized. Furthermore, skills in interpreting parameters in tests such as blood gasometry and clinical biochemistry will be reinforced, ensuring greater diagnostic accuracy. Skills in equipment calibration and medical waste control will also be strengthened, ensuring reliable procedures. As a result, evidence-based methodologies will be applied to support clinical decisions with the highest level of rigor and continuous updating.

You will identify hormonal imbalances, infections, and genetic factors that contribute to alterations in semen quality, improving its evaluation in the clinical laboratory"

General Objectives

- Understand the ISO standards applicable to modernized clinical laboratories to guarantee quality and efficiency in analytical processes
- Implement strategies for laboratory management and safety, including the proper handling of medical waste and emergency evacuation plans
- Optimize workflow through continuous procedure mapping and monitoring of analytical stages with clinical indicators
- Apply models for standardizing healthcare processes to reduce clinical variability and improve process management in the laboratory
- Develop competencies in healthcare document management, ensuring the correct installation, storage, and security of physical and electronic records
- Evaluate the quality in the clinical laboratory through audits, health inspections, and the application of ISO accreditations
- Master techniques for the validation and verification of analytical methods, ensuring accuracy and reliability in clinical results
- Analyze techniques for the cryopreservation of gametes and embryos, as well as their application in donation banks and assisted reproduction
- Interpret the study of bodily fluids, urine, and stool in the clinical laboratory, establishing their diagnostic relevance in various pathologies
- Apply therapeutic drug monitoring through pharmacokinetic studies, optimizing dosage and treatment effectiveness in patients

Specific Objectives

Module 1. Legal Framework and Standard Parameters of the Clinical Analysis Laboratory

- Describe the ISO standards applicable to a modern clinical laboratory and their impact on process optimization
- Describe the ISO standards applicable to a modern clinical laboratory and their impact on process optimization
- Determine the essential parameters for standardizing healthcare processes and their influence on reducing clinical variability
- Evaluate healthcare document management and its role in the traceability and security of clinical data
- Compare different quality check systems in clinical laboratories and their relation to current regulations
- Explain the application of the scientific method and Evidence-Based Medicine in interpreting clinical analyses

Module 2. Instrumental Techniques in the Clinical Analysis Laboratory

- Describe the classification of instrumental methods used in the clinical laboratory and their application in diagnosis
- Explain the fundamental principles of equipment calibration and its impact on the accuracy of analytical results
- Compare various microscopic techniques employed in clinical analysis, distinguishing their applications and limitations
- Determine the methodologies employed in volumetric, gravimetric, and electrochemical techniques, evaluating their utility in clinical analysis
- Analyze the use of spectral techniques in the identification and quantification of clinical biomarkers
- Identify the most commonly used immunoanalysis methods in clinical laboratories and their diagnostic applications
- Differentiate chromatographic and electrophoretic techniques based on their principles, instrumentation, and application areas in the laboratory
- Evaluate the interpretation of results obtained in clinical analysis, considering the influence of analytical interferences

Module 3. Biochemistry I

- Explain the biochemical and molecular bases of diseases, addressing genetic alterations, cellular signaling, and metabolism
- Describe nutrient metabolism and the biochemical phases of nutrition, including digestion, transport, metabolism, and excretion
- Identify vitamin deficiencies through biochemical studies of fat-soluble and water-soluble vitamins
- Evaluate biochemical markers of renal function and their importance in diagnosing metabolic disorders
- Differentiate physiological and pathological alterations of carbohydrates, lipids, and plasma lipoproteins, identifying their clinical impact
- Interpret results of acid-base balance, blood gasometry, and hydroelectrolyte balance in peripheral blood analysis

Module 4. Biochemistry II

- Detail the biochemical and molecular bases of diseases, including genetic alterations, cellular signaling, and metabolism
- Examine nutrient metabolism and the biochemical phases of nutrition, from digestion to excretion
- Relate biochemical alterations in plasma proteins and nitrogenous compounds to their clinical diagnostic impact
- Determine biochemical markers associated with carbohydrate metabolism regulation and their physiological alterations
- Classify physiological and pathological alterations of plasma lipids and lipoproteins, considering their relevance to health
- Establish the importance of acid-base balance, blood gasometry, and hydroelectrolyte balance in clinical evaluation

Module 5. Biochemistry III

- Describe congenital metabolic alterations of carbohydrates, including their physiological implications
- Explain amino acid metabolism disorders, differentiating their main causes and clinical consequences
- Examine dysfunctions in fatty acid β-oxidation and the carnitine cycle, highlighting their relevance to health
- Identify disorders of the urea cycle and their impact on the metabolic balance of the body
- Distinguish alterations in heme group synthesis and porphyrias, considering their diagnosis and clinical management
- Relate mitochondrial diseases to the biochemical mechanisms that cause them, addressing their diagnosis and treatment

Module 6. Biochemistry IV

- Establish the clinical and laboratory parameters used to assess fertility and infertility issues in both genders
- Address the main gynecological and andrological disorders related to infertility, along with their therapeutic implications
- Develop a deep understanding of assisted reproductive techniques, focusing on in vitro fertilization and artificial insemination
- Apply cell cryopreservation methodologies in the context of gamete preservation, highlighting freezing and thawing protocols
- Interpret various stages of embryonic development, recognizing their relevance for improving reproductive techniques
- Apply knowledge of cell growth and senescence in optimizing assisted reproduction processes
- Use molecular diagnostic tests to evaluate the presence of tumor markers, contributing to early cancer diagnosis
- Evaluate the impact of pharmacokinetics in therapeutic drug monitoring, considering absorption, distribution, and elimination

Module 7. Hematology

- Classify different blood cells and types of hematological diseases through hematimetric techniques and blood smears
- Determine the characteristics of anemia, erythrocytosis, and thalassemia through differential diagnosis in the laboratory
- Apply advanced cytogenetic and molecular biology tests in diagnosing hematological disorders

- Describe alterations in the white blood cell series, such as neutropenia, neutrophilia, lymphocytosis, and lymphopenia, in relation to associated clinical conditions
- Evaluate complex hematological pathologies, such as myeloproliferative and myelodysplastic syndromes, through blood tests and bone marrow studies
- Explore coagulation disorders, paying attention to hemorrhagic diatheses and coagulopathies, for precise diagnosis in clinical situations

Module 8. Microbiology and Parasitology

- Characterize the structure of microorganisms and mechanisms related to their nutrition, metabolism, and growth
- Classify bacterial microorganisms and viruses based on taxonomy and relevant clinical characteristics
- Apply microbiological identification techniques using automated systems and molecular tests to detect infections
- Evaluate antimicrobial resistance in microorganisms through sensitivity tests and resistance mechanisms
- Determine methods of virological diagnosis, including identifying viruses affecting the respiratory, digestive, and central nervous systems
- Identify and classify common mycoses, focusing on superficial, subcutaneous, and deep infections

Module 9. Immunology

- Understand the different organs of the immune system, their characteristics, and their specific functions in immune response
- Develop skills to describe the function of immune system cells, including granulocytes, monocytes, lymphocytes, and antigen-presenting cells
- Explain the concept of antigenicity and immunogenicity, as well as the classification and functions of immunoglobulins
- Relate complement system activation pathways and their effects on inflammation and immune response
- Identify mechanisms of immune tolerance and the pathogenesis of autoimmune diseases
- Evaluate the characteristics of primary and secondary immunodeficiencies, focusing on their clinical implications
- Establish the differences between innate and adaptive immune responses, emphasizing their importance in infection protection
- Apply advanced immunoanalytical techniques, such as ELISA and flow cytometry, in diagnosing immunological diseases

Module 10. Genetics

- Describe the historical development of genetics, highlighting key concepts and significant advances in the discipline
- Explain the structure of genes, gene expression regulation, and the principles of epigenetics in human health
- Detail the mechanisms of DNA mutation and repair, as well as their impact on genetic variability
- Understand the organization of the human genome and its relationship with genetic diseases, morbidity, and mortality
- Establish the different inheritance patterns, such as Mendelian, polygenic, and mitochondrial inheritance, and their clinical relevance
- Apply molecular biology techniques, such as PCR, mass sequencing, and cloning, in genetic diagnosis and research
- Characterize numerical and structural chromosomal abnormalities, such as polyploidies, aneuploidies, and translocations, and their clinical implications
- Evaluate prenatal and preimplantation diagnostic methods for genetic alterations and congenital defects
- Explore the molecular bases of sporadic and familial cancer, and how genetic and environmental factors influence its development
- Identify advances in genomics and proteomics, including functional genomics, the proteome, and their applications in personalized and precision medicine

Interpret advanced genetic tests, applying appropriate procedures for making accurate, personalized clinical diagnoses"

05

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.

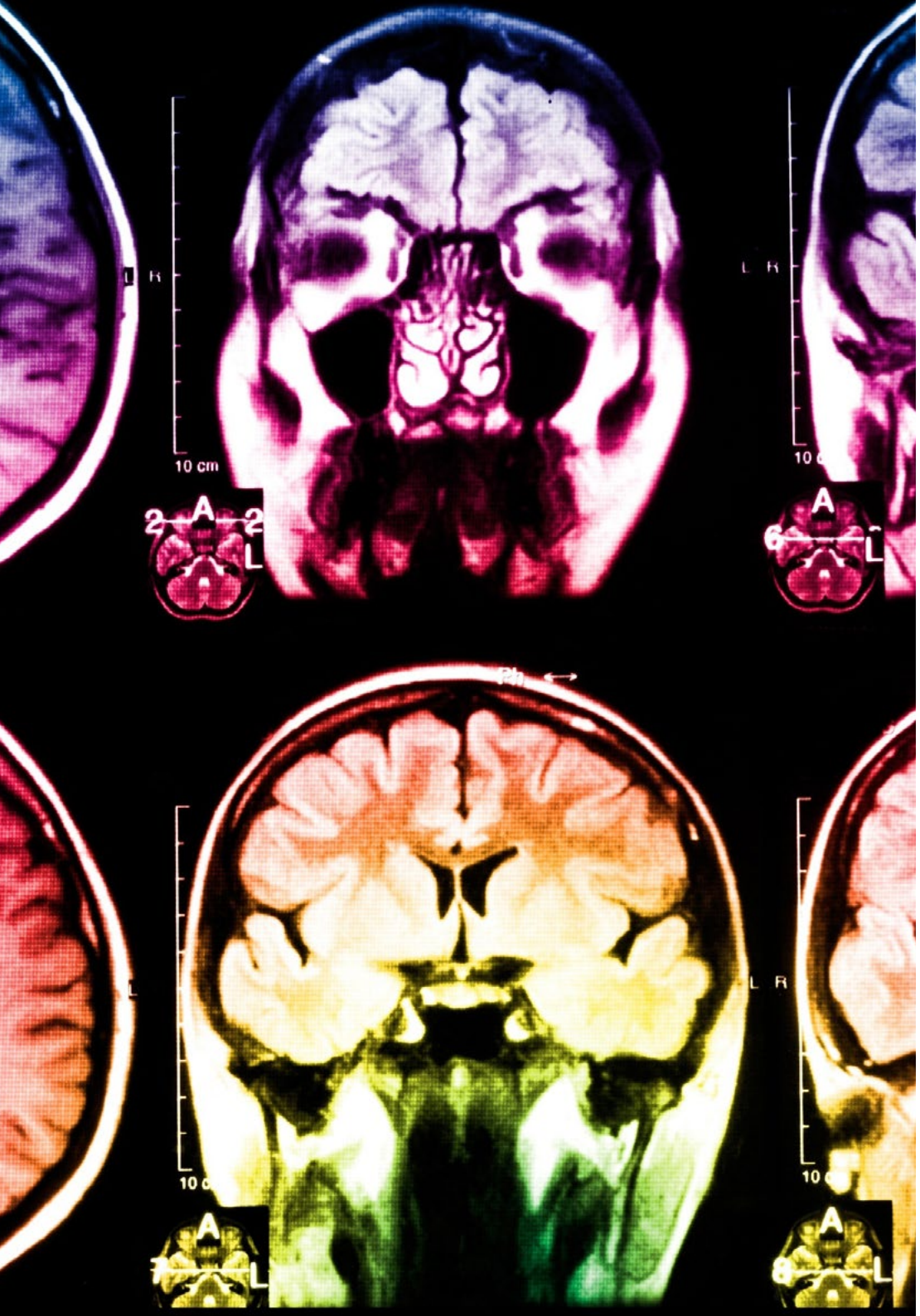
In order to facilitate tutor-student contact as much as possible, you will have a wide range of communication possibilities, both in real time and delayed (internal messaging, telephone answering service, email contact with the technical secretary, chat and videoconferences).

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.

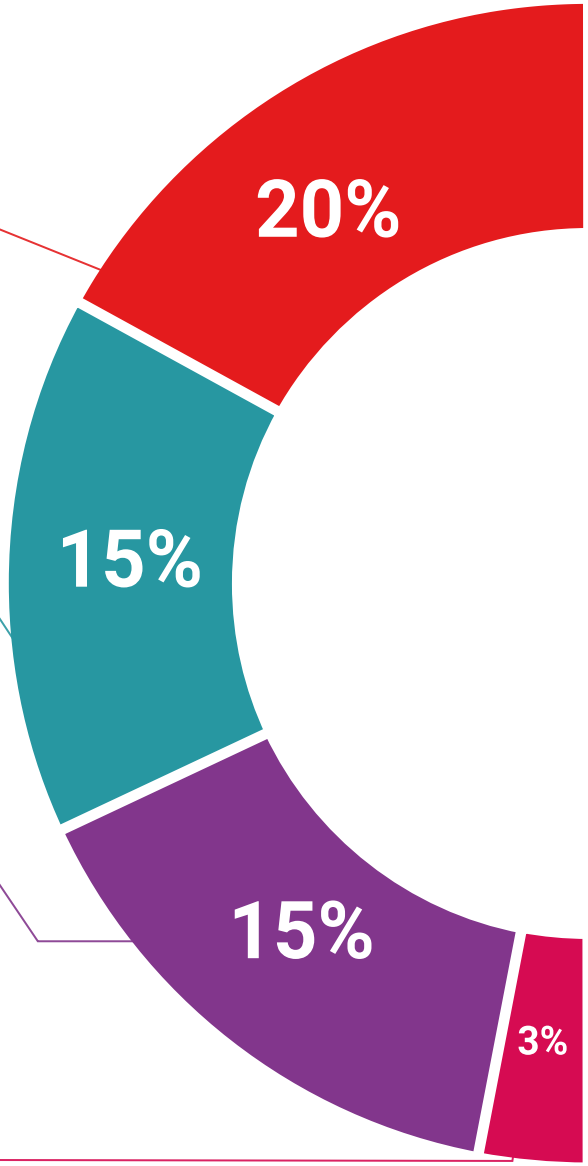
Interactive Summaries

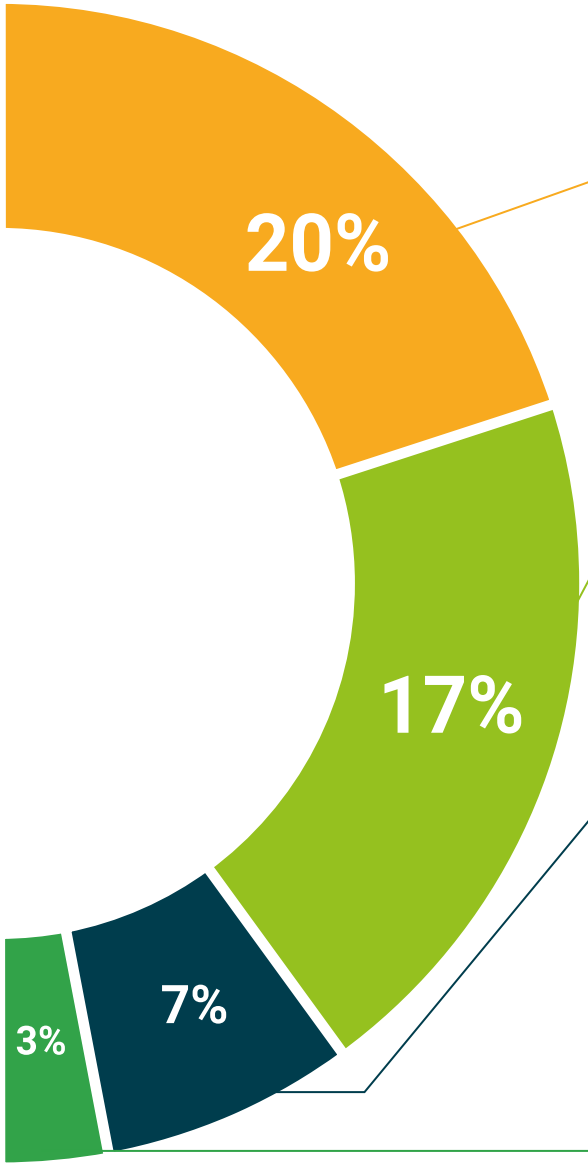
We present the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

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.





Case Studies

Students will complete a selection of the best case studies in the field. Cases that are presented, analyzed, and supervised by the best specialists in the world.

Testing & Retesting

We periodically assess and re-assess your knowledge throughout the program. We do this on 3 of the 4 levels of Miller's Pyramid.

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 for 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

Teaching Staff

The philosophy of TECH University is based on offering the most comprehensive and up-to-date university degrees in the academic market, so that graduates experience progress in their professional careers. That's why it rigorously selects the members of its teaching staff. For this program, TECH brings together genuine specialists in the field of Clinical Analysis. These professionals have extensive professional experience, allowing them to be part of prestigious international healthcare institutions.

You will benefit from a curriculum designed by true leaders in the field of Clinical Analysis"

International Guest Director

Dr. Jeffrey Jhang is a dedicated expert in Clinical Pathology and Laboratory Medicine. He has won several awards in these areas of health, including the Dr. Joseph G. Fink Award, from the Columbia University College of Medicine and Surgery, and other awards 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 New York Tisch Hospital
- Professor of Pathology at the NYU Grossman School of Medicine
- Medical Director of the Clinical Laboratory Center of 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 and 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

- Research Project Coordinator
- Coordinator of research studies at 12 de Octubre University Hospital
- Vaccine and Infection Studies Coordinator at CSISP-Salud Publica
- Clinical Research Assistant at TFS HealthScience
- Professor in postgraduate university studies
- Degree in Biology by the University of Alicante
- Master's Degree in Clinical Trials from the University of Sevilla
- Professional Master's Degree in Clinical Analysis from the University CEU Cardenal Herrera
- Professional Master's Degree in Primary Care Research from the Miguel Hernández University of Elche

Teachers

Mr. Del Río Riego, Javier

- Embryologist at La Paz Hospital
- Bachelor's Degree in Biology from the University of Seville
- Specialized in Assisted Human Reproduction at the University of Oviedo
- Senior Biologist in the Andrology and Assisted Human Reproduction Section of the Clinical Analysis Service at La Paz University Hospital
- University Expert in Medical Genetics from the University of Valencia
- Master's Degree in Biology and Reproductive Technology

Dr. Calle Guisado, Violeta

- Researcher in Microbiology
- Responsible for the Microbiology Laboratory at Gallina Blanca
- Research Laboratory Technician at the University of Extremadura
- Researcher in several university centers and hospitals
- Lecturer in university studies and job training courses
- Doctor in Public and Animal Health by the UEx
- Degree in Biology from the UEx
- Master's Degree in Research in Science from the UEx

Dr. Carmona Talavera, Diego

- Technical Director at Eurofins Megalab Canaria, Hospital San Roque
- Specialist in Clinical Analysis at Clinical Hospital Benidorm and San Juan University Hospital
- Resident Representative, National Commission of Clinical Analysis (Ministry of Health)
- PhD in Physiology, University of Valencia
- Master's Degree in Theoretical Basis and Laboratory Procedures of Assisted Reproduction, University of Valencia
- Master's Degree in Bioethics, University of Murcia
- Bachelor's Degree in Biochemistry, University of Córdoba
- University Expert in Medical Genetics and Genomics, UCAM (Catholic University of Murcia)
- Diploma of Specialist in Health Services Management, University of Seville
- Member of AEFA

Dr. Naranjo Santana, Yurena

- Technical Director, Eurofins Megalab Canary Islands, San Roque Hospital
- Specialist in Clinical Analysis, Benidorm Clinic Hospital and San Juan University Hospital
- Head of Clinical Analysis Service, Perpetuo Socorro Hospital, Vithas Group
- Technical Pharmaceutical Director, A.G. y Asociados IMPOCAN
- PhD in Public Health, University of Las Palmas de Gran Canaria
- Master's Degree in Public Health, Miguel Hernández University
- Member of: Member of the Spanish Association of Medical Biopathology and the Spanish Association of Analytical Pharmacists

Dr. Santo Quiles, Ana María

- PhD in Pharmacy, Miguel Hernández University of Elche
- Specialist Pharmacist in Clinical Analysis through FIR (Pharmacy Residency Program)
- Bachelor's Degree in Pharmacy, Miguel Hernández University of Elche
- University Specialist in Human Reproduction Biology, VII Edition of the Official Postgraduate Course of the Department of Histology and Anatomy at Miguel Hernández University in collaboration with Vistahermosa Clinic

Dr. Corbacho Sánchez, Jorge

- Expert Researcher in Genomics
- Postdoctoral Researcher at the Andalusian Center for Developmental Biology
- Technical Specialist in the Functional Genomics Service at the Andalusian Center for Developmental Biology
- PhD in Plant Molecular Biology, University of Extremadura
- Bachelor's Degree in Biology, University of Extremadura
- Master's Degree in Food Science and Technology, University of Extremadura
- Master's Degree in Advanced Bioinformatic Analysis, Pablo de Olavide University

Ms. Cela Rodríguez, Carmela

- Specialist in Biochemistry and Clinical Analysis
- Predoctoral Researcher FPI at the Center for Molecular Biology Severo Ochoa (CBMSO)
- Co-founder and member of the Management Committee of the SEI Young Group
- Graduate in Biochemistry from the UCM
- Master's Degree in Immunology Research, UCM
- Expert in Public Communication and Science Dissemination by the UAM
- Academic-scientific stay at the Trinity College Dublin

Ms. Utrilla Carriazo, Carmen Lucía

- Biochemist Specialist in Neurosciences
- Collaborating researcher at the Achucarro Basque Center for Neuroscience
- *Science Communicator on YouTube at the channel "Ciencia con Carmen"*
- Graduate in Biochemistry from the Complutense University of Madrid
- Master's Degree in Neurosciences from the UCM

Ms. Aparicio Fernández, Cristina

- Researcher in Biomedicine
- Graduate in Biotechnology from the University of León
- Master's Degree in Advanced Immunology from the University of Barcelona
- Master's Degree in Management and Monitoring of Clinical Trials by the University CEU Cardenal Herrera

Dr. Solar Málaga, Soraya

- Scientific Staff and Researcher in the Intracellular Signaling and Reproductive Technology Group (SINTREP)
- Graduate in Biochemistry from the University of Extremadura
- Master's Degree in Agroalimentary Production by the University of Cádiz
- Author and speaker at several congresses in the service of her specialty

Ms. Tapia Poza, Sandra

- Biologist specialized in Clinical Analysis
- Graduate in Biology from the University of Alcalá de Henares
- Master's Degree in Microbiology and Parasitology: Research and Development by the Complutense University of Madrid
- Postgraduate Degree as University Expert in Clinical Analysis and Hematology Laboratory from San Jorge University
- University Specialization Course in Biostatistics Applied to Health Sciences by the European University Miguel de Cervantes

A unique, essential and decisive learning experience to boost your professional development"

07

Certificate

The Professional Master's Degree in Clinical Analysis 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 private qualification will allow you to obtain a **Professional Master's Degree in 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** private qualification is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Professional Master's Degree in Clinical Analysis**

Modality: **online**

Duration: **12 months**

Accreditation: **60 ECTS**

tech global university

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

Professional Master's Degree in Clinical Analysis

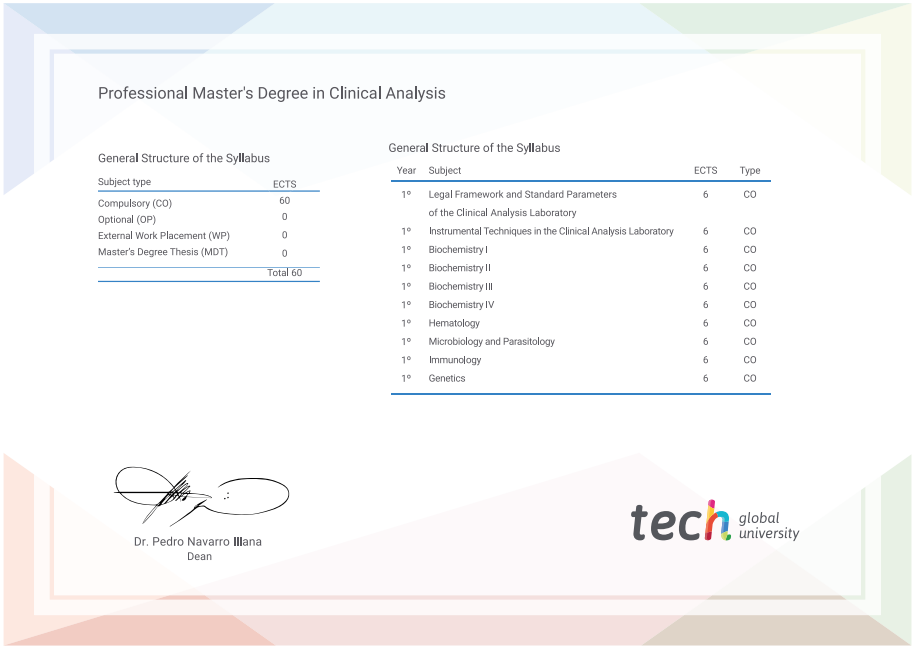
This is a private qualification of 1,800 hours of duration equivalent to 60 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

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

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

Dr. Pedro Navarro Illana
Dean

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



Professional Master's Degree in Clinical Analysis

General Structure of the Syllabus

Subject type	ECTS
Compulsory (CO)	60
Optional (OP)	0
External Work Placement (WP)	0
Master's Degree Thesis (MDT)	0
	Total 60

General Structure of the Syllabus

Year	Subject	ECTS	Type
1º	Legal Framework and Standard Parameters of the Clinical Analysis Laboratory	6	CO
1º	Instrumental Techniques in the Clinical Analysis Laboratory	6	CO
1º	Biochemistry I	6	CO
1º	Biochemistry II	6	CO
1º	Biochemistry III	6	CO
1º	Biochemistry IV	6	CO
1º	Hematology	6	CO
1º	Microbiology and Parasitology	6	CO
1º	Immunology	6	CO
1º	Genetics	6	CO

Dr. Pedro Navarro Illana
Dean

tech global university

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


tech global university
Professional Master's Degree
Clinical Analysis
» Modality: online
» Duration: 12 months
» Certificate: TECH Global University
» Credits: 60 ECTS
» Schedule: at your own pace
» Exams: online

Professional Master's Degree

Clinical Analysis

tech global university