# Postgraduate Diploma

## Diagnostic Tests in a Clinical Analysis Laboratory

tech technological university

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## Diagnostic Tests in a Clinical Analysis Laboratory

Course Modality: **Online**
Duration: **6 months.**
Certificate: **TECH Technological University**
**24 ECTS Credits**
Teaching Hours: **600 hours.**
**Website:** www.techtitute.com/medicine/postgraduate-diploma/postgraduate-diploma-diagnostic-tests-clinical-analysis-laboratory

# Index

01

# Introduction

The precise diagnosis of any type of pathology must always pass through a clinical analysis laboratory. This is a broad and complex area of work that requires highly specialized professionals who know how to competently perform the various techniques required by the specific tests in each case.

In this complete course we offer you the possibility to achieve your qualification 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.

*The techniques and procedures of clinical analysis laboratory work compiled in a specialist course of the highest teaching quality"*

This module provides students with the necessary skills to perform their work with the utmost excellence as clinical personnel in a laboratory. It addresses the legal framework of a clinical laboratory, where the need for standardization of work and quality control of procedures and files is evident, given the high demand for analytical tests.

The specialty of Clinical Analysis has an eminently multidisciplinary format and this Postgraduate Diploma has been created taking this important factor into account. Through this Postgraduate Diploma the clinical professional will achieve excellence in the knowledge of instrumental techniques and sample collection techniques, as the basis of analytical methodology. This is one of the fundamental points of their expertise as specialists in the area. Upon completing this course, the professional will have gained an understanding of instrumental techniques and their management, being equipped with specialized skills in order to perform these tasks in the laboratory.

The increasing occurrence of new health problems makes it necessary for professionals to have a deeper understanding of the different pathologies. The specialist knowledge of laboratory personnel is essential for dealing with emerging diseases and, given the degree of student involvement in the course, TECH Technological University has adapted to the modern world by offering a new, high-quality online format.

As an additional aspect, Microbiology is the part of science that deals with identifying the microorganisms that cause infections and determining the sensitivity they may present to the various antimicrobial drugs. Infectious pathology involves various medical specialties working together because we encounter infected patients in all specialties. For a correct microbiological diagnosis, it is essential to have good and clear communication between the different professionals of each specialty.

This **Postgraduate Diploma in Diagnostic Tests in a Clinical Analysis Laboratory** offers you the advantages of a high-level scientific, teaching, and technological course. These are some of its most notable features:

- Latest technology in online teaching software.
- 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.
- Self-regulating 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"*

*Acquire the necessary professional skills with this course in Diagnostic Tests in a Clinical Analysis Laboratory and gain a competitive edge and the best job prospects"*

*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 teachers of this course 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 deliver the educational 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 bring the practical knowledge from their own experience to the course: one of the differential qualities of this course.

This mastery of the subject is complemented by the effectiveness of the methodological design of this Postgraduate Diploma in Diagnostic Tests in a Clinical Analysis Laboratory. 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 easy-to-use and versatile multimedia tools that will give you the necessary skills you need for your specialization.

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# 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 study plan totally adapted to the student, this Postgraduate Diploma will progressively allow you to acquire the skills that will push you towards a much higher professional level.

*A specialization aimed at achieving the professional skills necessary to perform the different procedures in the clinical analysis laboratory safely and correctly"*

## General Objectives

- Evaluate the ISO standards of a clinical laboratory.
- Demonstrate the importance of good safety and sanitary waste management.
- Identify the need for correct management of health documentation.
- Present why quality control is obligatory in a clinical laboratory.
- Define the clinical indicators of analytical quality.
- Identify clinical decision levels within reference ranges.
- Define scientific method and its relationship with medicine based on scientific evidence.
- Analyze and carry out the instrumental techniques and sample collection processes that specifically apply to medical clinical analysis laboratories as well as understanding the basics and the correct management of the necessary instruments.
- Apply the instrumental techniques in the resolution of problems in health analysis.
- Gain specialized knowledge to carry out the tasks specific to a clinical analysis laboratory in terms of the implementation of new analytic methods and the monitoring the quality of those already implemented.
- Define the procedures used in clinical analysis laboratories for the use of different techniques as well as for sample collection and those aspects related to validation, calibration, automization and processing of the information obtained from the procedures.
- Examine the concepts of fertility and infertility.
- Determine the current techniques for assisted reproduction.
- Analyze the techniques for preserving gametes and their clinical application.
- Identify techniques of cellular growth and cell apoptosis.
- Evaluate the study of cancer from a molecular point of view.



- Examine the etiological, pathogenic, epidemiological, treatment and diagnostic bases of the main microbial and parasitic diseases affecting human beings.
- Apply the acquired knowledge to the control of transmittable infectious diseases, both in the hospital and the out-of-hospital environment.
- Acquire appropriate skills to select the correct diagnostic method with the consequent preparation of a report on the efficiency of the techniques employed.
- Develop specialised knowledge to carry out a good organization and management of the services in a microbiology clinic. Coordinate activities and teams, and adapt them to the needs and resources available.
- Acquire advanced epidemiological knowledge to anticipate and avoid the factors that cause or condition the acquisition of infectious diseases.
- Gain skills to work in a clinical laboratory, research or teaching team, recognising the specific responsibilities needed in each speciality field.
- Provide advanced, specialized, multidisciplinary and up-to-date training, with an academic and scientific approach, oriented to a career in the clinical field or as a professional in R&D.

## Specific Objectives

- Define workflows within a clinical analysis laboratory.
- Identify the evacuation plan during a health emergency.
- Develop knowledge on the types of sanitary waste.
- Present the need for process management.
- Develop the administrative procedure for health documentation.
- Identify the types of health inspections.
- Define ISO accreditations within the framework of an audit.
- Develop reference intervals through validation guidelines.
- Analyze the steps of the scientific method.
- Present scientific evidence levels and their relation with clinical analysis.
- 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.
- Develop the fundamental theoretical concepts for the understanding of in-depth instrumental techniques.
- Establish the direct applications of instrumental techniques of clinical analysis in human health as a diagnostic and preventive element.
- Analyze the process prior to the use of the instrumental techniques to 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.
- Evaluate the most frequent gynecological and andrological problems in the clinical laboratory.
- Specify assisted reproduction techniques such as artificial insemination.
- Identify the legal framework of the gamete donation bank.
- Develop the stages of the embryo under the inverted microscope.
- Define the parameters of cellular culture.
- Analyze the hematoxylin-eosin staining technique.
- Examine the types of tumor markers.
- Analyze the use of uroanalysis.
- Acquire advanced knowledge in Clinical Microbiology and Parasitology. Study the main infectious diseases of clinical interest.
- Identify disease-causing microorganisms in humans, to understand the pathophysiology and to practice detection and diagnostic techniques within a framework of responsibility and health safety.
- Organize the preparation of necessary material for its use in the Microbiology laboratory and check for sterility when appropriate. Know the basis and operation of any culture environment in order to use it to perform the different tests used in the microbiology laboratory.

- Correctly handle the different apparatus and equipment used in the Microbiology laboratory.
- Establish a proper functioning through a registration system for sample collection and processing.
- Design specific work protocols for each pathogen, selecting the appropriate parameters for its correct diagnosis, based on criteria of effectiveness and efficiency.
- Interpret antimicrobial or antiparasitic sensitivity in order to provide the best treatment.
- Know the new techniques used for the identification of pathogens.
- Establish proper communication between the laboratory and the clinic.
- Promote and monitor compliance with internal and external quality controls and safety standards.

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

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"*

## Management

### Cano Armenteros, Montserrat

- Bachelor's Degree in Biology. University of Alicante
- Master'a Degree in Clinical Trials University of Seville
- Official Professional Master's Degree in Primary Care Research from the Miguel Hernández University of Alicante
- 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.

### Tapia Poza, Sandra

- Degree in Biology from the University of Alcalá de Henares 2018.
- Master's Degree in Microbiology and Parasitology: Research and Development from the Complutense University of Madrid, 2019.
- Degree in Biology from the University of Alcalá de Henares, 2018.
- Master's Degree in Microbiology and Parasitology: Research and Development from the Complutense University of Madrid, 2019.
- Postgraduate Course in Clinical Analysis and Hematology Laboratory (San Jorge University, 2020)
- University Specialization Course in Biostatistics Applied to Health Sciences (European University Miguel de Cervantes, 2020)

04

# Structure and Content

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

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

*A high-intensity specialized training that will allow you to acquire the necessary skills to work safely and competently in this interesting field"*

## **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 Variablity
- 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. Administrative Procedures
  - 1.4.3.1. Standardized Work Plan
  - 1.4.3.2. Records
  - 1.4.3.3. Location
  - 1.4.3.4. Transfer
  - 1.4.3.5. Conservation
  - 1.4.3.6. Withdrawal
  - 1.4.3.7. Elimination



1.4.4. Electronic Archive Records
1.4.5. Quality Guarantee
1.4.6. 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. Installations
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. Application 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. Application 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. Instruments
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. Instruments
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 Techniques 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. Application 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 masses, Gases masses and Liquids masses

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 Tehniques 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 Used Applications in Bedside 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 IV

3.1. Study of Human Fertility and Infertility
3.1.1. Most Frequent Gynecological Problems
3.1.1.1. Reproductive System Abnormalities
3.1.1.2. Endometriosis
3.1.1.3. Polycystic Ovaries
3.1.1.4. FSH Serum Concentration
3.1.2. Most Common Andrological Problems
3.1.2.1. Seminal Quality Alteration
3.1.2.2. Retrograde Ejaculation
3.1.2.3. Neurological Lesions
3.1.2.4. FSH Concentration
3.2. Current Assisted Reproduction Techniques
3.2.1. Artificial Insemination
3.2.2. IUI-H
3.2.3. IUI-D
3.2.4. Ovarian Puncture
3.2.5. In Vitro Fertilization and Intracytoplasmic Sperm Injection
3.2.6. Gamete Transfer
3.3. Techniques for Gamete Conservation in a Urology Laboratory Gamete Donation Bank
3.3.1. Current Legal Framework
3.3.2. Principles of Cell Cryopreservation
3.3.3. Oocyte Freezing/Thawing Protocol
3.3.4. Semen Freezing/Thawing Protocol
3.3.5. Gamete Donation Bank
3.3.5.1. Concept and Purpose of Assisted Reproduction
3.3.5.2. Donor Characteristics
3.4. Study of Embriology and Andrology in the Clinical Laboratory
3.4.1. Pre-embryo and Sperm Culture
3.4.2. Embryo Stages
3.4.3. Seminal Study Techniques
3.4.3.1. Seminogram
3.4.3.2. Seminal Lavage
3.5. Laboratory Techniques for the Study of Cell Growth, Senescence and Apoptosis
3.5.1. Study of Cell Growth
3.5.1.1. Concept
3.5.1.2. Conditioning Parameters of Cell Growth
3.5.1.2.1. Viability
3.5.1.2.2. Multiplication
3.5.1.2.3. Temperature
3.5.1.2.4. External Agents
3.5.1.3. Practical Applications in Clinical Analysis
3.5.2. Study of Cellular Senescence and Apoptosis
3.5.2.1. Concept of Senescence
3.5.2. Hematoxylin/Eosin Staining
3.5.4. Clinical Application of Oxidative Stress
3.6. Analysis of Body Fluids
3.6.1. Amniotic Fluid
3.6.2. Saliva Nasopharynx
3.6.3. LCR
3.6.4. Synovial Fluid
3.6.5. Pleural
3.6.6. Pericardial
3.6.7. Peritoneal

3.7. Urine Study in the Urology and Pathological Anatomy Laboratory
- 3.7.1. Systematic Uroanalysis
- 3.7.2. Urine culture
- 3.7.3. Pathological Anatomy Cytology

3.8. Clinical Study of Stools
- 3.8.1. Physical Study
- 3.8.2. Hidden Blood in Stools
- 3.8.3. Fresh Study
- 3.8.4. Stool Culture

3.9. Molecular Study of Cancer. Most Common Tumor Markers
- 3.9.1. PSA
- 3.9.2. EGFR
- 3.9.3. HER2 Gene
- 3.9.4. CD20.
- 3.9.5. Neuron-Specific Enolase NSE
- 3.9.6. FAP
- 3.9.7. ALK Gene
- 3.9.8. ROS1 Gene
- 3.9.9. BRAF V600e Mutation

3.10. Therapeutic Drug Monitoring Pharmacokinetics
- 3.10.1. Concept
- 3.10.2. Study Parameters
  - 3.10.2.1. Absorption
  - 3.10.2.2. Distribution
  - 3.10.2.3. Elimination
- 3.10.3. Aplicaciones clínicas de la farmacocinética

## **Module 4.** Microbiology and Parasitology

4.1. General Concepts of Microbiology
- 4.1.1. Structure of Microorganisms
- 4.1.2. Nutrition, Metabolism and Microbial Growth
- 4.1.3. Microbial Taxonomy
- 4.1.4. Microbial Genomes and Genetics

4.2. Study of Infectious Bacteria
- 4.2.1. Gram Positive Cocci
- 4.2.2. Gram Negative Cocci
- 4.2.3. Gram Positive Bacilli
- 4.2.4. Gram Negative Bacilli
- 4.2.5. Other Bacteria of Clinical Interest
  - 4.2.5.1. Legionella Pneumophila
  - 4.2.5.2. Mycobacteria

4.3. General Techniques in Microbiology
- 4.3.1. Processing of Microbiological Samples
- 4.3.2. Types of Microbiological Samples
- 4.3.3. Planting Techniques
- 4.3.4. Types of Staining in Microbiology
- 4.3.5. Current Microorganism Identification Techniques
  - 4.3.5.1. Biochemical Tests
  - 4.3.5.2. Manual or Automatic Commercial Systems and Multitest Galleries
  - 4.3.5.3. MALDI TOF Mass Spectrometry
  - 4.3.5.4. Molecular Tests
    - 4.3.5.4.1. 16S rRNA
    - 4.3.5.4.2. 16S-23S rRNA
    - 4.3.5.4.3. 23S rRNA
    - 4.3.5.4.4. rpoB Gene
    - 4.3.5.4.5. gyrB Gene
  - 4.3.5.5. Serological Diagnosis of Microbial Infections

4.4. Antimicrobial Sensitivity Tests
- 4.4.1. Antimicrobial Resistance Mechanisms
- 4.4.2. Sensitivity Test
- 4.4.3. Antibacterials

4.5. Study of Viral Infections
- 4.5.1. Basic Principles of Virology
- 4.5.2. Taxonomy
- 4.5.3. Viruses Affecting the Respiratory System
- 4.5.4. Viruses Affecting the Digestive System
- 4.5.5. Viruses Affecting the Central Nervous System
- 4.5.6. Viruses Affecting the Reproductive System
- 4.5.7. Systemic Viruses

4.6. General Techniques in Virology
- 4.6.1. Processing of Samples
- 4.6.2. Laboratory Techniques for Viral Diagnosis
- 4.6.3. Antivirals

4.7. Most Common Fungal Infections
- 4.7.1. General Information on Fungi
- 4.7.2. Taxonomy
- 4.7.3. Primary Mycoses
- 4.7.4. Opportunist Mycoses
- 4.7.5. Subcutaneous Mycoses
- 4.7.6. Cutaneous and Superficial Mycoses
- 4.7.7. Mycosis of Atypical Etiology

4.8. Diagnostic Techniques in a Clinical Mycology
- 4.8.1. Processing of Samples
- 4.8.2. Study of Superficial Mycoses
- 4.8.3. Study of Subcutaneous Mycoses
- 4.8.4. Study of Deep Mycoses
- 4.8.5. Study of Opportunist Mycoses
- 4.8.6. Diagnostic Techniques
- 4.8.7. Antifungal

4.9. Parasitic diseases
- 4.9.1. General Concepts of Parasitology
- 4.9.2. Protozoa
  - 4.9.2.1. Amoeba (Sarcodina)
  - 4.9.2.2. Ciliates (Ciliophora)
  - 4.9.2.3. Flagellates (Mastigophora)
  - 4.9.2.4. Apicomplexa
  - 4.9.2.5. Plasmodium
  - 4.9.2.6. Sarcocystis
  - 4.9.2.7. Microsporidios
- 4.9.3. Helmintos
  - 4.9.3.1. Nematodes
  - 4.9.3.2. Platyhelminthes
    - 4.9.3.2.1. Cestodes
    - 4.9.3.2.2. Trematodes
- 4.9.4. Arthropods

4.10. Diagnostic Techniques in a Clinical Parasitology
- 4.10.1. Processing of Samples
- 4.10.2. Diagnostic Methods
- 4.10.3. Antiparasitics

*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 training program provides you with a different way of learning. Our methodology uses a cyclical learning approach: ***Re-learning.***

This teaching system is used 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 Re-learning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"*

## At TECH we use the Case Method

In a given situation, what would you do? Throughout the program, you will be presented with multiple simulated clinical cases based on real patients, where you will have to investigate, establish hypotheses and, finally, resolve the situation. There is abundant scientific evidence on the effectiveness of the method. Specialists learn better, faster, and more sustainably over time.

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


According to Dr. Gérvas, the clinical case is the annotated presentation of a patient, or group of patients, which becomes a "case", an example or model that illustrates some peculiar clinical component, either because of its teaching potential 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 professional medical 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:**

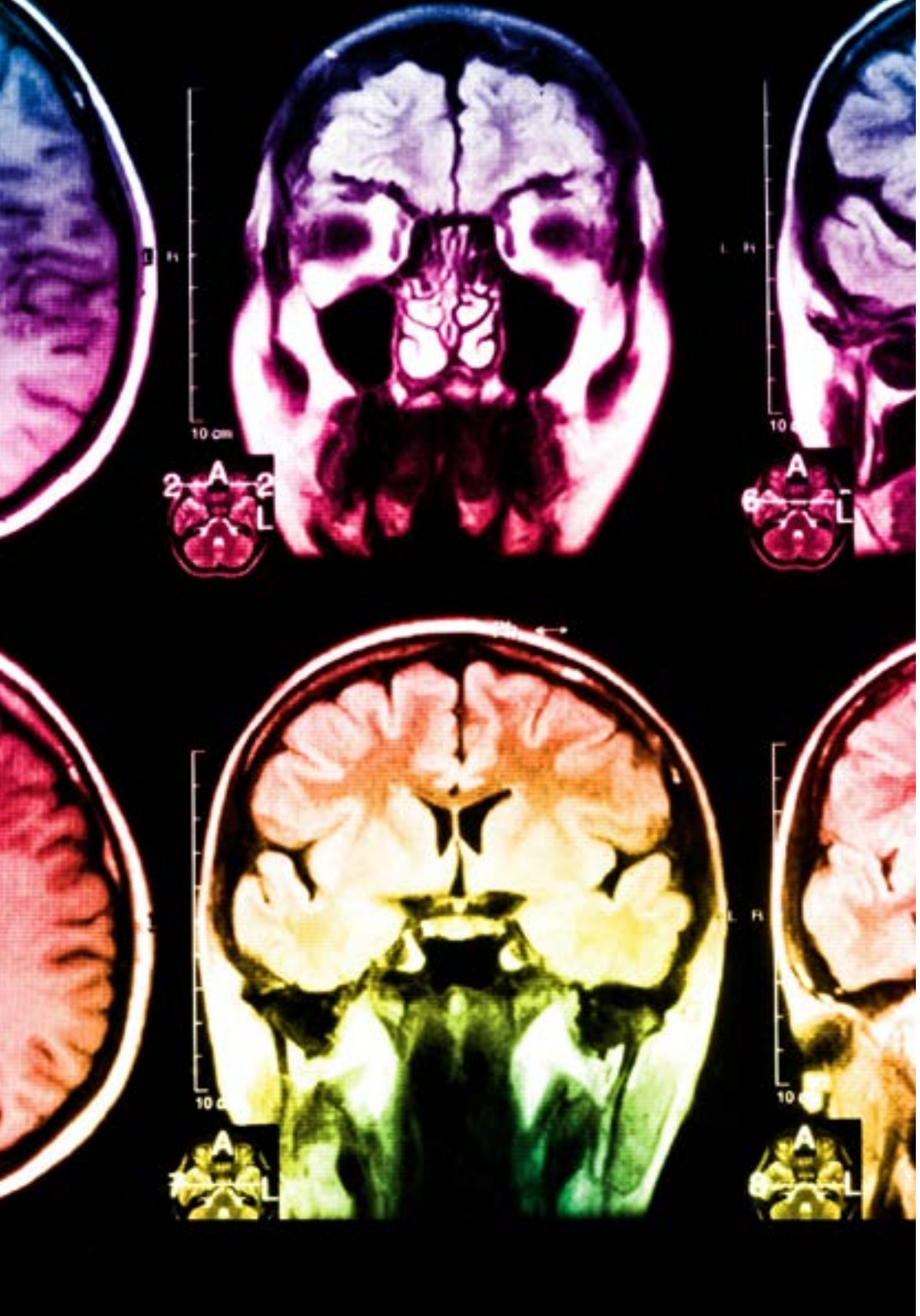
1. Students who follow this method not only grasp concepts, but also develop their mental capacity by evaluating real situations and applying their knowledge.
2. The learning process has a clear focus on practical skills that allow the student to better integrate into the real world.
3. Ideas and concepts 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.

## Re-Learning Methodology

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

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 Re-learning method has managed to improve the overall satisfaction levels of professionals who complete their studies, with respect to the quality indicators of the best Spanish-speaking online university (Columbia University).

With this methodology we have trained more than 250,000 physicians with unprecedented success, in all clinical specialties regardless of the surgical load. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

*Re-learning 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 (we learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically.

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

**In this program you will have access to the best educational material, prepared with you in mind:**

### Study Material

All teaching material is produced specifically for the course by the specialists who teach 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.

### Latest Techniques and Procedures on Video

We introduce you to the latest techniques, to the latest educational advances, to the forefront of current medical techniques. All this, in first person, with the maximum rigor, explained and detailed for your assimilation and understanding. And best of all, you can watch them as many times as you want.

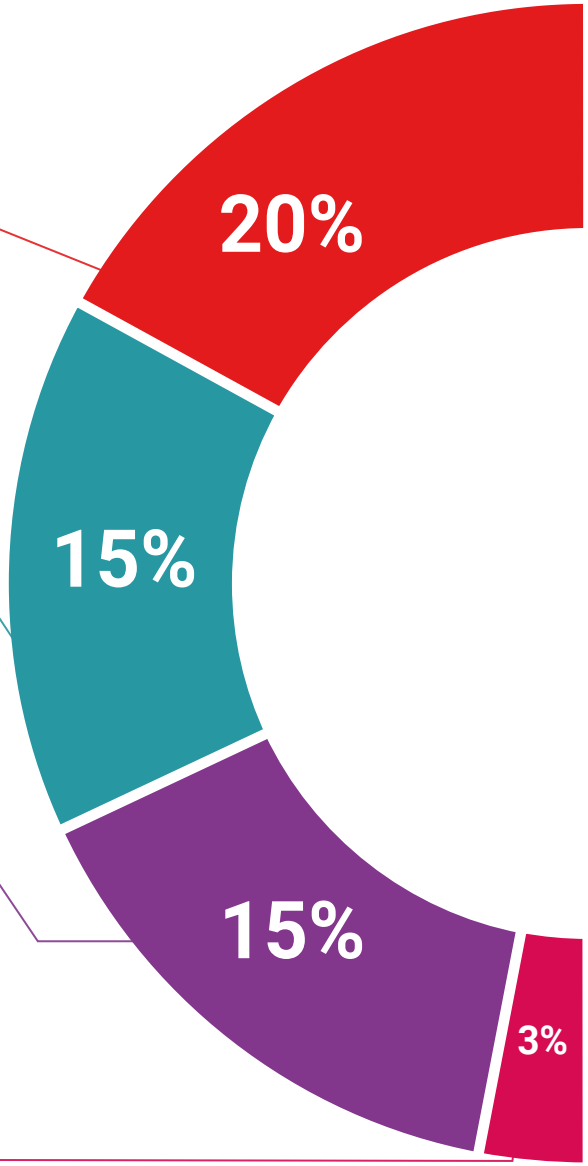
### Interactive Summaries

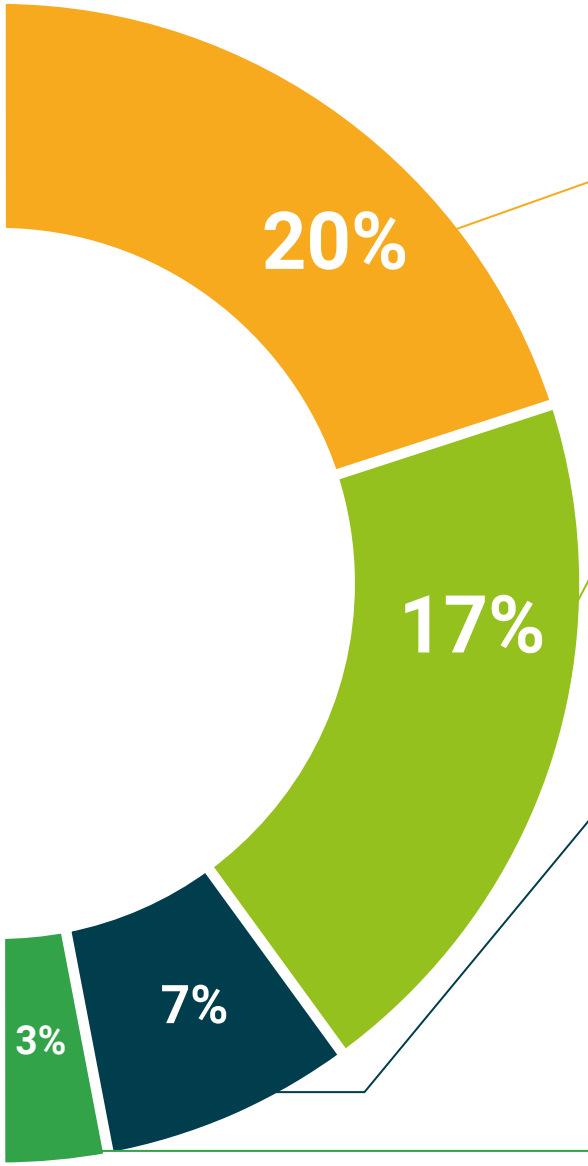
We present the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This unique multimedia content presentation training system 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 training.






### Expert-Led Case Studies and Case Analysis

Effective learning ought to be contextual. Therefore, we will present you with real case developments in which the expert will guide you through focusing on and solving the different situations: a clear and direct way to achieve the highest degree of understanding.

### Testing & Re-Testing

We periodically evaluate and re-evaluate your knowledge throughout the program, through assessment and self-assessment activities and exercises: so that you can see how you are achieving your goals.

### Classes

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

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

### Quick Action Guides

We offer you the most relevant contents of the course in the form of worksheets or quick action guides. A synthetic, practical, and effective way to help you progress in your 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.

*Include in your training a Postgraduate Diploma in Diagnostic Tests in a Clinical Analysis Laboratory: a highly qualified added value for any medical professional"*

This **Postgraduate Diploma in Diagnostic Tests in a Clinical Analysis Laboratory** contains the most complete and up-to-date scientific program on the market.

After students have passed the assessments, they will receive their Postgraduate Diploma issued by **TECH Technological University** and sent by certified mail.

The certificate issued by **TECH Technological University** will specify the qualification obtained though the Postgraduate Diploma, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Postgraduate Diploma in Diagnostic Tests in a Clinical Analysis Laboratory**

ECTS: **24**

Official Number of Hours: **600**


tech technological university

Awards the following

CERTIFICATE

to

Mr./Ms. _____, with identification number _____.

For having passed and accredited the following program

POSTGRADUATE DIPLOMA

in

Diagnostic Tests in a Clinical Analysis Laboratory

This is a qualification awarded by this University, with 24 ECTS credits and equivalent to 600 hours, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH is a Private Institution of Higher Education recognized by the Ministry of Public Education as of June 28, 2018.

June 17, 2020

Tere Guevara Navarro
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

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

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# Postgraduate Diploma

## Diagnostic Tests in a Clinical Analysis Laboratory

Course Modality: **Online**
Duration: **6 months.**
Certificate: **TECH Technological University**
**24 ECTS Credits**
Teaching Hours: **600 hours.**

# Postgraduate Diploma

## Diagnostic Tests in a Clinical Analysis Laboratory

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