# Postgraduate Certificate
## Medical Bioinformatics

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# Postgraduate Certificate
## Medical Bioinformatics

- Modality: **Online**
- Duration: **6 weeks**
- Certificate: **TECH Global University**
- Accreditation: **6 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Website: www.techtitute.com/us/medicine/postgraduate-certificate/medical-bioinformatics

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# Introduction

The continuous advances in biomedicine, linked to the development of a more complex and complete technology capable of covering more and more needs, forces specialists in the different branches of medicine to know and control the equipment and software most frequently used in their practices. Handling this information can be complicated That is the reason why programs like these are essential for specialists to be able to implement in specialized knowledge about the techniques and applications of Medical Bioinformatics into their daily practice. Through the best content and with the facilities provided by online education, you will be able to improve your knowledge and be more professional and confident in your career.

*Develop specialized knowledge of data mining techniques and examine the computer hardware and software required in Medical Bioinformatics"*

Specialists in any branch of medicine are accustomed to handling a large amount of data related to patients' clinical histories, test results, statistical data, etc. However, the development of Biomechanical Engineering applied to health sciences has brought not only promising results in terms of diagnosis and treatment, but has also made the work of physicians more difficult in relation to the increasing amount of information they have to work with.

In-depth knowledge of Medical Bioinformatics will not only allow the specialist to work more easily and confidently, but will also help them to better manage data and, as a result, have a better chance of success in their work. This Postgraduate Certificate follows this line of action.

Throughout the program's 6-week duration, the teaching staff, composed of biomedical experts, has distributed the teaching load in different topics among which a referential framework in Medical Bioinformatics will be developed. Graduates will be able to analyze artificial intelligence and Big Data techniques, work in prevention, delve into the methodology and workflow and assess the factors associated with sustainable bioinformatics applications and future trends.

The syllabus, available in its entirety from day one, allows the specialist to download it to any device. The specialists themselves set the pace, deciding when and where to access the virtual classroom. In addition, they will also be able to arrange personalized tutorials with the teaching team and access additional exclusive TECH content to continue expanding their knowledge based on their own guidelines and criteria.

This **Postgraduate Certificate in Medical Bioinformatics** contains the most complete and up-to-date educational program on the market. Its most notable features are:

- Practical cases presented by experts in Biomedicine
- The graphic, schematic and eminently practical contents with which it is conceived gather scientific and practical information on those disciplines that are indispensable 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 work.
- Content that is accessible from any fixed or portable device with an Internet connection.

*TECH bases its success on: the guarantee of offering the best online education in the world, quality content at the forefront of the industry and a commitment to the specialist to provide them with the best knowledge"*

*Arrange a tutorial with the specialists in charge of the program and expand your frontiers in the world of Medical Bioinformatics"*

*With this Postgraduate Certificate you will delve into the methodology and workflow of Medical Bioinformatics.*

*Content 100% downloadable and available from the first day.*

The program's teaching staff includes professionals from the industry who contribute their work experience to this program, as well as renowned specialists from leading 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 immersive education programmed to learn in real situations.

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

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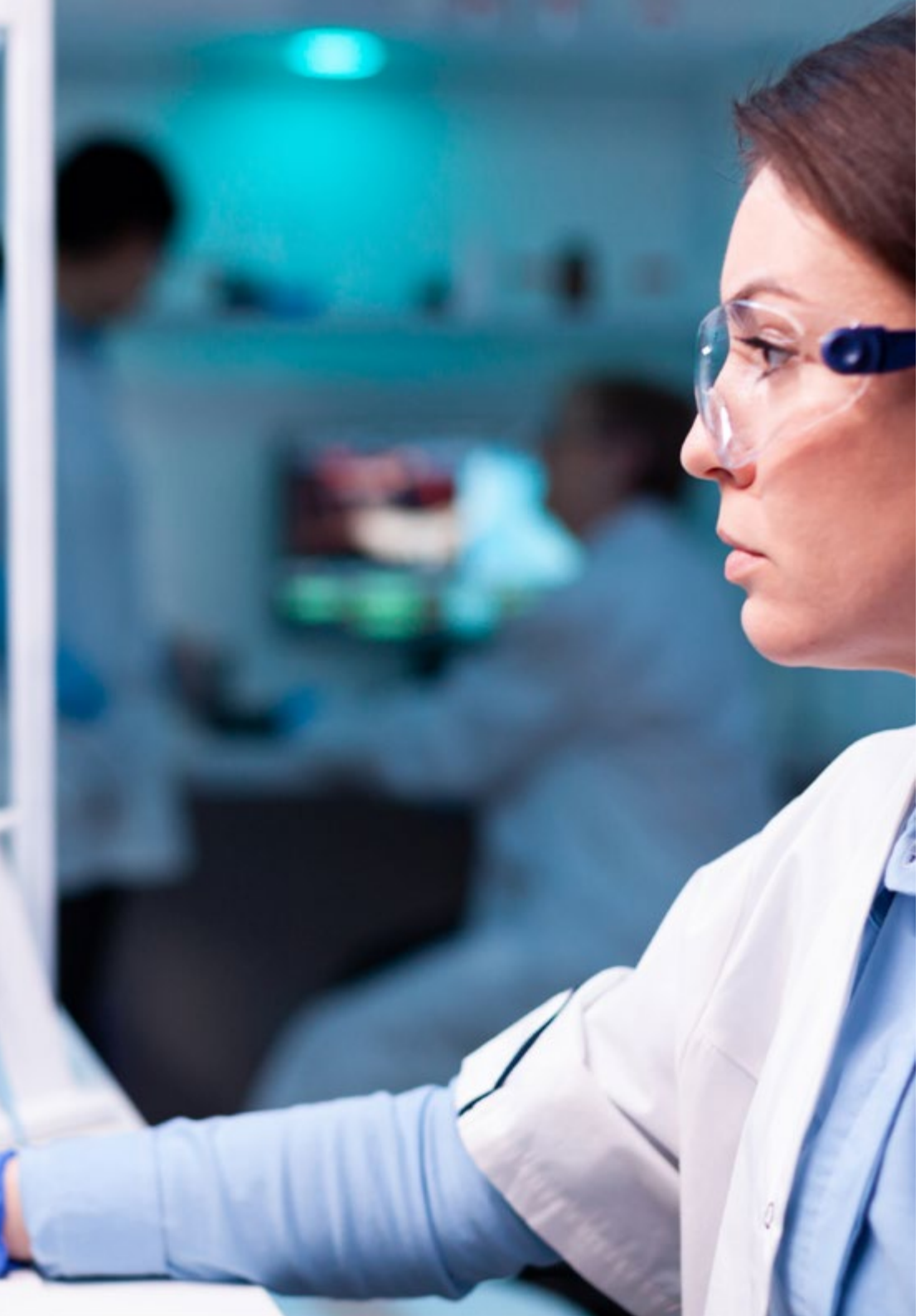
# Objectives

The complexity with which this subject is developed forces TECH to create a program with the main objective of providing the information to the specialist in a clear way, facilitating their understanding and allowing them to explore the concepts studied during the program with relative ease. In other words, it will provide them with the key concepts that will allow them to skilfully navigate between the different tools that include Medical Bioinformatics and the methods and techniques with the best guarantee of success.


*TECH's objective is for the specialist to get the most out of this Postgraduate Certificate during the 180 hours that make up this program"*

## General Objectives

- Generate specialized knowledge on the main types of biomedical signals and their uses
- Develop the physical and mathematical knowledge underlying biomedical signals
- Fundamentals of the principles governing signal analysis and processing systems
- Analyze the main applications, trends and lines of research and development in the field of biomedical signals
- Develop expertise in classical mechanics and fluid mechanics
- Analyze the general functioning of the motor system and its biological mechanisms
- Develop models and techniques for the design and prototyping of interfaces based on design methodologies and their evaluation
- Provide the student with critical skills and tools for interface assessment
- Explore the interfaces used in pioneering technology in the biomedical sector
- Analyze the fundamentals of medical imaging acquisition, inferring its social impact
- Develop specialized knowledge about the operation of the different imaging techniques, understanding the physics behind each modality
- Identify the usefulness of each method in relation to its characteristic clinical applications
- Investigate post-processing and management of acquired images
- Use and design biomedical information management systems
- Analyze current digital health applications and design biomedical applications in a hospital setting or clinical center





## Specific Objectives

- Develop a reference framework for medical bioinformatics
- Examine computer hardware and software required in medical bioinformatics
- Generate specialized knowledge on data mining techniques in Bioinformatics
- Analyze artificial intelligence and Big Data techniques in medical bioinformatics
- Establish the applications of bioinformatics for prevention, diagnosis and clinical therapies
- Deepen in the methodology and medical bioinformatics workflow
- Assess the factors associated with sustainable bioinformatics applications and future trends

*TECH will provide you with all the tools you need to achieve your goals"*

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# Course Management

As this is a very specific science, the management and teaching staff of this Postgraduate Certificate has been assembled according to the specific specialization and work experience of each of its members. That is why we have a faculty composed of expert engineers in Medical Bioinformatics with a long professional career in research associated with this field. This group of specialists has been in charge of designing the program, making use of the most up-to-date contents in the sector and aided by the most innovative pedagogical tools available at TECH.

*You will have the support of the teaching staff from the very beginning, who will be ready to help you whenever you need it"*

## Management

### Mr. Ruiz Díez, Carlos

- Specialist in Biological and Environmental Engineering
- Specialist in Biological and Environmental Engineering
- Researcher at the National Microelectronics Center of the CSIC
- Director of Competitive Engineering Training at ISC
- Volunteer trainer at Caritas Employment Classroom
- Research intern in the Composting Research Group of the Department of Chemical, Biological and Environmental Engineering of the UAB.
- Founder and product developer at NoTime Ecobrand, a fashion and recycling brand
- Development cooperation project manager for the NGO Future Child Africa in Zimbabwe
- Director of the Innovation Department and Founding Member of the Aerodynamic Department team of ICAI
- Speed Club: Racing Motorcycle Racing Team, Pontificia University de Comillas
- Graduate in Industrial Technologies Engineering from Pontificia University de Comillas ICAI.
- Master's Degree in Biological and Environmental Engineering from the Autonomous University of Barcelona.
- Master's Degree in Environmental Management from Spanish Open University

## Professors

### Dr. Vásquez Cevallos, Leonel

- Advisor in the Preventive and Corrective Maintenance and Sale of Medical Equipment and Software
- Director of Telemedicine Cayapas Research Project
- Manager of Knowledge Transfer and Knowledge Management at Officegolden
- Received medical imaging equipment maintenance training in Seoul, South Korea
- PhD's Degree in Biomedical Engineering from the Polytechnic University of Madrid.
- Master's Degree in Telemedicine and of Bioengineering from the Polytechnic University of Madrid.
- Engineer Graduate in Electronics and Telecommunications from the ESPOL University, Ecuador
- Teachers at Polytechnic University of Madrid.
- Professor at the University ESPOL Ecuador
- Professor at the University of Guayaquil.
- Professor at Technological University of Business in Guayaquil.

### Dr. Zavallo, Ana Teresa

- Senior data management analyst at Asphalion
- Analytical development analyst at Craveri
- Galenic development analyst at Craveri
- Technology transfer analyst at Gador
- Regulatory site compliance analyst at Merck
- Ph.D. in Pharmacy from the University of Buenos Aires
- Ph.D. in Biochemistry from the University of Buenos Aires
- Degree in Pharmacy from the University of Buenos Aires
- Degree in Biochemistry from the University of Buenos Aires
- Specialization in Magistral Formulation from BIOXENTYS
- MBA and Business Leadership in Pharmaceutical Talent from the European University
- of Madrid
- Postgraduate degree in Pharmaceutical Product Development

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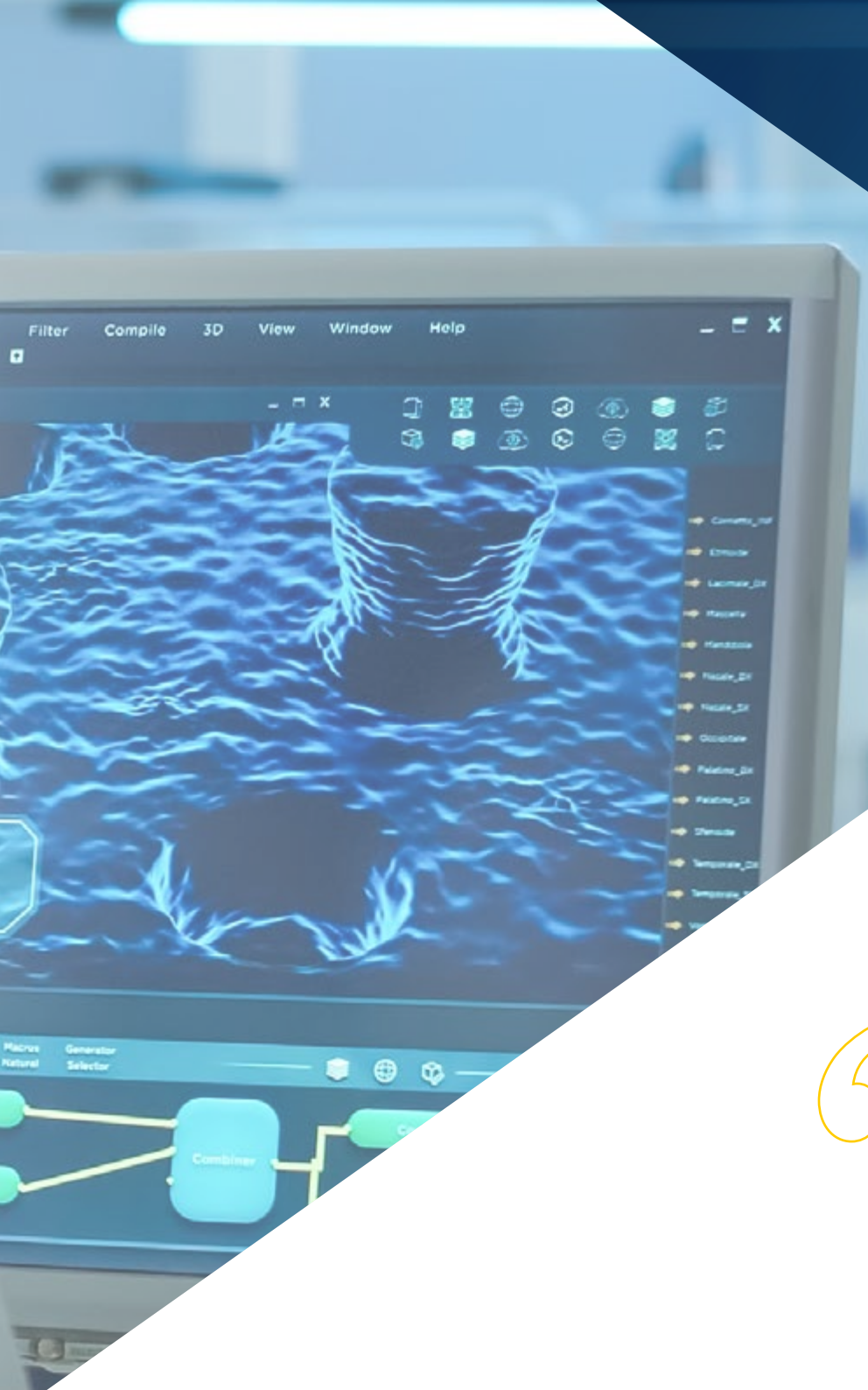
# Structure and Content

TECH uses the *Relearning* methodology in all of its programs, through which the most important information is reiterated as the syllabus progresses, favoring knowledge acquisition and promoting a gradual and successful educational experience. In addition, the main content is complemented by a series of additional materials that not only include dynamic summaries and real case studies, but also audiovisual material of the highest quality and research articles selected (and sometimes developed) by TECH experts.




*Save hours of study time with the Relearning methodology and invest all that time in continuing to become a better medical professional"*

## **Module 1.** Medical Bioinformatics

1.1. Medical Bioinformatics
- 1.1.1. Computing in Medical Biology
- 1.1.2. Medical Bioinformatics
  - 1.1.2.1. Bioinformatic Applications
  - 1.1.2.2. Computer Systems, Networks and Medical Databases
  - 1.1.2.3. Applications of Medical Bioinformatics in Human Health

1.2. Computer Equipment and software Required in Bioinformatics
- 1.2.1. Scientific Computing in Biological Sciences
- 1.2.3. The Computer
- 1.2.4. Hardware, Software and Operating Systems
- 1.2.5. Workstations and Personal Computers
- 1.2.6. High-Performance Computing Platforms and Virtual Environments
- 1.2.7. Linux Operating System
  - 1.2.7.1. Linux Installation
  - 1.2.7.2. Using the Linux Command Line Interface

1.3. Data Analysis Using R Programming Language
- 1.3.1. Language R Statistical Programming
- 1.3.2. Installation and Uses of R
- 1.3.3. Data Analysis Methods With R
- 1.3.4. R Applications in Medical Bioinformatics

1.4. Data Analysis Using R Programming Language
- 1.4.1. Multipurpose Programming Language Python
- 1.4.2. Installation and Uses of Python
- 1.4.3. Data Analysis Methods With Python
- 1.4.4. Python Applications in Medical Bioinformatics

1.5. Methods of Human Genetic Sequence Analysis
- 1.5.1. Human Genetics
- 1.5.2. Techniques and Methods for Sequencing Analysis of Genomic Data
- 1.5.3. Sequence Alignments
- 1.5.4. Tools for Detection, Comparison and Modeling of Genomes



1.6. Data Mining in Bioinformatics
- 1.6.1. Phases of Knowledge Discovery in Databases, KDD
- 1.6.2. Processing Techniques
- 1.6.3. Knowledge Discovery in Biomedical Databases
- 1.6.4. Human Genomics Data Analysis

1.7. Artificial Intelligence and Big Data Techniques in Medical Bioinformatics
- 1.7.1. *Machine Learning* for Medical Bioinformatics
  - 1.7.1.1. Supervised Learning: Regression and Classification
  - 1.7.1.2. Unsupervised Learning *Clustering* and Association Rules
- 1.7.2. Big Data
- 1.7.3. Computing Platforms and Development Environments

1.8. Applications of Bioinformatics for Prevention, Diagnosis and Clinical Therapies
- 1.8.1. Disease-Causing Gene Identification Procedures
- 1.8.2. Procedure to Analyze and Interpret the Genome for Medical Therapies
- 1.8.3. Procedures to Assess Genetic Predispositions of Patients for Prevention and Early Diagnosis

1.9. Medical Bioinformatics Workflow and Methodology
- 1.9.1. Creation of Workflows to Analyze Data
- 1.9.2. Application Programming Interfaces, APIs
  - 1.9.2.1. R and Python Libraries for Bioinformatics Analysis
  - 1.9.2.2. Bioconductor: Installation and Uses
- 1.9.3. Uses of Bioinformatics Workflows in Cloud Services

1.10. Factors Associated with Sustainable Bioinformatics Applications and Future Trends
- 1.10.1. Legal and Regulatory Framework
- 1.10.2. Best Practices in the Development of Medical Bioinformatics Projects
- 1.10.3. Future Trends in Bioinformatics Applications

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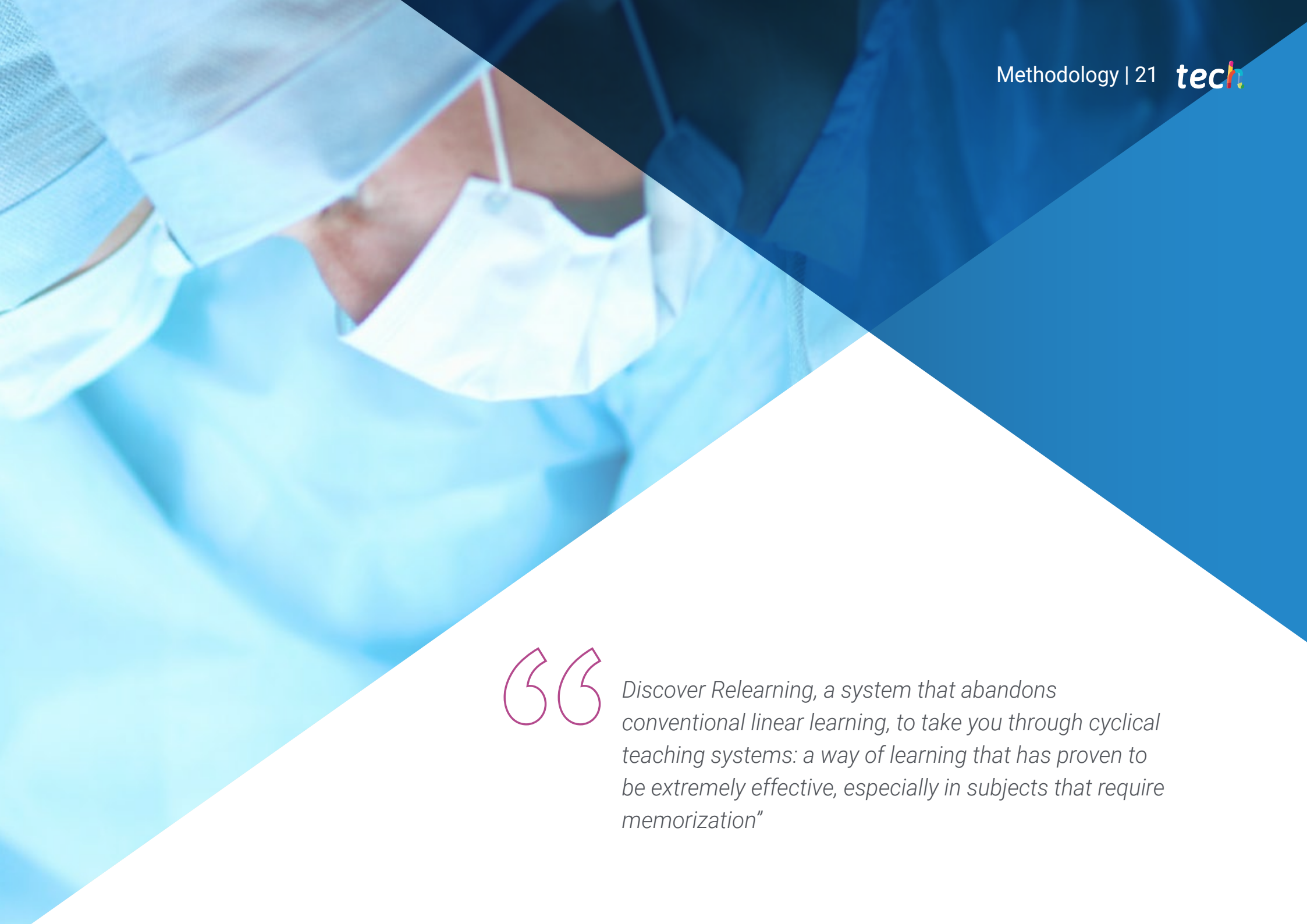
# Methodology

This program offers students a different way of learning. Our methodology uses a cyclical learning approach: Relearning.
This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the New England Journal of Medicine have considered it to be one of the most effective.



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

## At TECH, we use the Case Method

What should a professional do in a given situation? Throughout the program, students will face multiple simulated clinical cases, based on real patients, in which they will have to do research, establish hypotheses, and ultimately resolve the situation. There is an abundance of scientific evidence on the effectiveness of the method. Specialists learn better, faster, and more sustainably over time.

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


According to Dr. Gérvas, the clinical case is the annotated presentation of a patient, or group of patients, which becomes a "case", an example or model that illustrates some peculiar clinical component, either because of its teaching power or because of its uniqueness or rarity. It is essential that the case is based on current professional life, trying to recreate the real conditions in the physician's professional practice.

*Did you know that this method was developed in 1912, at Harvard, for law students? The case method consisted of presenting students with real-life, complex situations for them to make decisions and justify their decisions on how to solve them. In 1924, Harvard adopted it as a standard teaching method.*

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

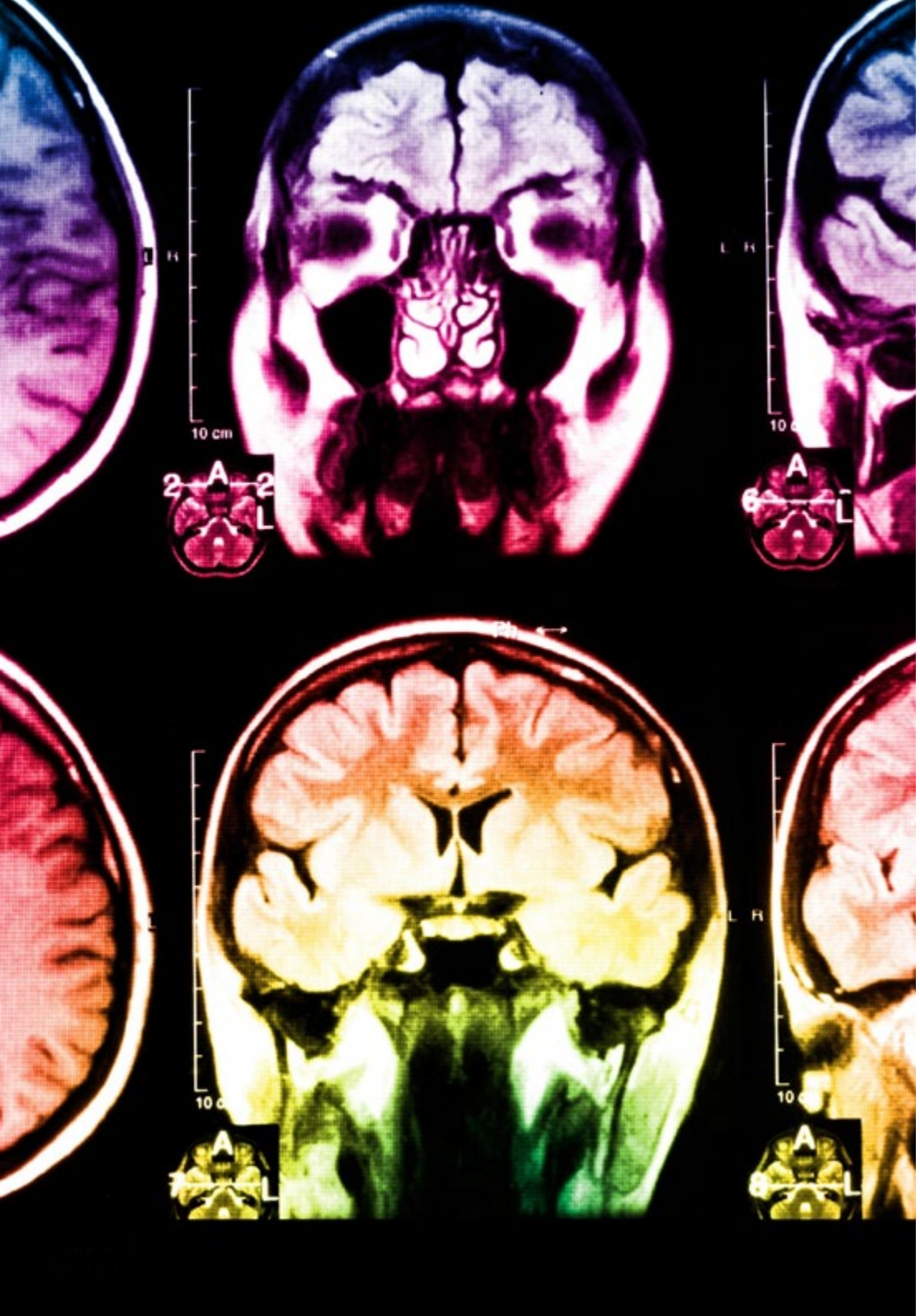
1. Students who follow this method not only achieve the assimilation of concepts, but also a development of their mental capacity, through exercises that assess real situations and the application of knowledge.
2. Learning is solidly translated into practical skills that allow the student to better integrate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

## Relearning Methodology

TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

We enhance the Case Study with the best 100% online teaching method: Relearning.

*Professionals will learn through real cases and by resolving complex situations in simulated learning environments. These simulations are developed using state-of-the-art software to facilitate immersive learning.*



At the forefront of world teaching, the Relearning method has managed to improve the overall satisfaction levels of professionals who complete their studies, with respect to the quality indicators of the best online university (Columbia University).

With this methodology, more than 250,000 physicians have been prepared with unprecedented success in all clinical specialties regardless of surgical load. Our educational methodology is developed in a highly competitive environment, with a university student body with a strong socioeconomic profile and an average age of 43.5 years old.

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

In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically.

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

**This program offers the best educational material, prepared with professionals in mind:**

### Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then adapted in audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high-quality pieces in each and every one of the materials that are made available to the student.

### Surgical Techniques and Procedures on Video

TECH introduces students to the latest techniques, the latest educational advances and to the forefront of current medical techniques. All of this in direct contact with students and explained in detail so as to aid their assimilation and understanding. And best of all, you can watch the videos as many times as you like.

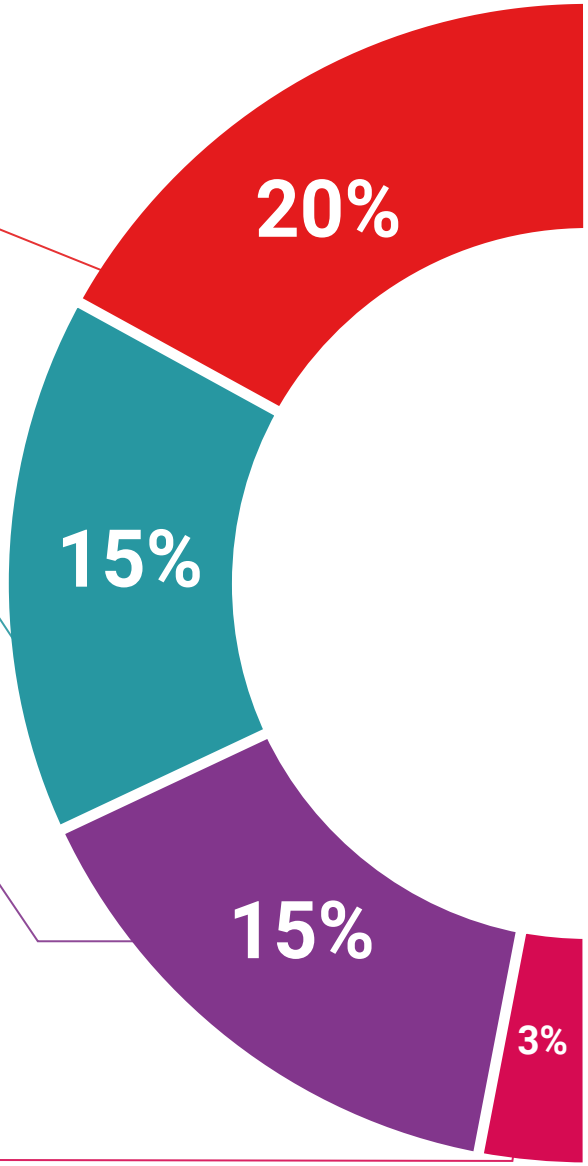
### Interactive Summaries

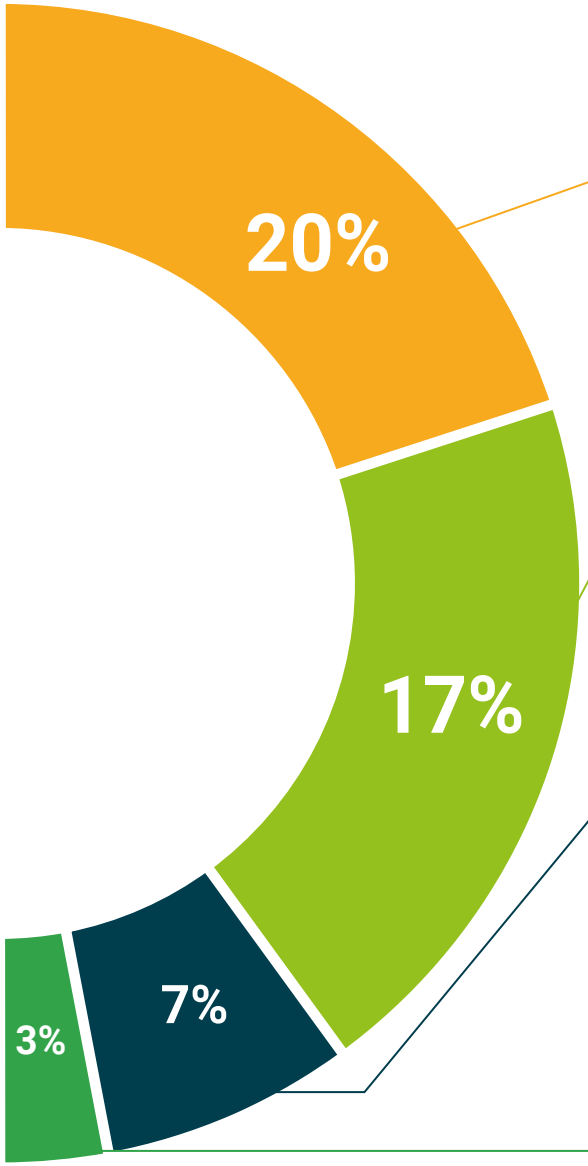
The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

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

### Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.






### Expert-Led Case Studies and Case Analysis

Effective learning ought to be contextual. Therefore, TECH presents real cases in which the expert will guide students, focusing on and solving the different situations: a clear and direct way to achieve the highest degree of understanding.

### Testing & Retesting

We periodically assess and re-assess students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.

### Classes

There is scientific evidence on the usefulness of learning by observing experts. The system known as Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

### Quick Action Guides

TECH offers the most relevant contents of the course in the form of worksheets or quick action guides. A synthetic, practical and effective way to help students progress in their learning.

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# Certificate

The Postgraduate Certificate in Medical Bioinformatics guarantees, in addition to the most accurate 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 **Postgraduate Certificate in Medical Bioinformatics** 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: **Postgraduate Certificate in Medical Bioinformatics**

Modality: **online**

Duration: **6 weeks**

Accreditation: **6 ECTS**


tech global university

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

**Postgraduate Certificate in Medical Bioinformatics**

This is a program of 180 hours of duration equivalent to 6 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

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

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

Dr. Pedro Navarro Illana
Rector

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

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


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