# Postgraduate Certificate

## Big Data Analytics and Machine Learning in Clinical Research

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# Postgraduate Certificate

## Big Data Analytics and Machine Learning in Clinical Research

- Modality: **online**
- Duration: **6 weeks**
- Certificate: **TECH Technological University**
- Dedication: **16h/week**
- Schedule: **at your own pace**
- Exams: **online**

Website: **www.techtitute.com/pk/medicine/postgraduate-certificate/big-data-analytics-machine-learning-clinical-research**

# Index

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# Introduction

Big Data Analytics and Machine Learning in Clinical Research has revolutionized the way diseases are approached and understood. These tools allow huge medical datasets to be analyzed quickly and accurately, identifying patterns, trends and correlations that might go unnoticed by conventional methods. This enables the personalization of treatments and more precise diagnoses, accelerating the development of drugs and therapies. It also facilitates the identification of possible side effects or drug interactions. This is why TECH has conceived a comprehensive educational plan that will immerse physicians in the most cutting-edge advances in this field, based on the innovative *Relearning* methodology.

*You will address the integration of Big Data and Machine Learning in Clinical Research, improving your understanding of complex diseases"*

Big Data Analytics and Machine Learning have emerged as fundamental tools in the field of Clinical Research, providing significant benefits in the healthcare field. The use of large, real-time data sets enables researchers to identify complex patterns and correlations in the information collected from patients, facilitating the early detection of trends and the personalization of treatments. As such, this convergence of technologies not only accelerates the research process, but also contributes to more precise and personalized medicine.

In this context, TECH has developed this Postgraduate Certificate in Big Data Analytics and Machine Learning in Clinical Research, which will offer a deep dive into the strategic use of large datasets and machine learning techniques in the medical field. Therefore, the syllabus will focus on multiple key aspects, from the exploration of data in clinical registries, to the application of Artificial Intelligence models in epidemiology and analysis of complex biological networks.

Opportunities for early detection of pathologies, personalization of treatments and optimization of medical protocols will also be analyzed. In addition, solutions to challenges such as data privacy, information quality and correct interpretation of results will be addressed. In this way, the program will prepare professionals to lead advances in modern medicine, taking full advantage of the potential of Big Data Analytics and Machine Learning in Clinical Research.

TECH has devised a comprehensive approach based on the cutting-edge *Relearning* methodology to educate highly qualified experts in AI applications. This way of learning will focus on the repetition of fundamental ideas in order to strengthen a deep understanding of the contents. Only an electronic device with an Internet connection will be needed to access the contents, eliminating the obligation to be physically present or adhere to established schedules.

This **Postgraduate Certificate in Big Data Analytics and Machine Learning in Clinical Research** contains the most complete and up-to-date scientific program on the market. The most important features include:

- The development of case studies presented by experts in Big Data Analytics and Machine Learning in Clinical Research
- 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

*You will apply Machine Learning algorithms to predict clinical outcomes, optimize treatment protocols and improve efficiency in the identification of relevant biomarkers"*

*You will acquire skills to address significant challenges, such as the efficient management of large volumes of information, analyzing their practical applications in the biomedical field"*

*You will delve into data mining in clinical records to extract valuable patterns, all through the innovative multimedia resources included in the program.*

*Thanks to this 100% online program you will not only gain solid theoretical knowledge, but also practical skills through the use of specialized tools and platforms.*

The program's teaching staff includes professionals from the sector 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, the students will be assisted by an innovative interactive video system created by renowned and experienced experts.

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# Objectives

The fundamental objectives of the program are to provide professionals with a solid understanding of Big Data analytical tools and the use of Machine Learning algorithms in the medical context. As such, graduates will be qualified in the identification and application of effective strategies to analyze large clinical datasets, extracting relevant patterns that can drive meaningful discoveries in Medicine. In addition, they will focus on developing practical skills for the design and implementation of Artificial Intelligence models to predict medical outcomes, personalize treatments and optimize clinical decision making.


*You will dig into Big Data analytics applied to clinical data, including the acquisition, cleaning and exploration of large biomedical datasets"*

## General Objective

- Acquire a solid understanding of *Big Data* concepts in the clinical setting and become familiar with essential tools for its analysis

*You will equip yourself with practical skills to meet the specific challenges of Clinical Research, such as secure management of sensitive data and accurate interpretation of results"*



## Specific Objectives

- Gain a solid understanding of the fundamental concepts of *Big Data* in the clinical setting and become familiar with the essential tools used for its analysis
- Explore advanced data mining techniques, machine learning algorithms, predictive analytics, and AI applications in epidemiology and public health
- Analyze biological networks and disease patterns to identify connections and potential treatments
- Address data security and manage challenges associated with large volumes of data in biomedical research
- Investigate case studies that demonstrate the potential of *Big Data* in biomedical research

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# Course Management

The teaching team of this Postgraduate Certificate stands out for its multidisciplinary specialization and its vast experience in the confluence between Data Science and Medicine. These professionals are highly qualified in the application of Big Data techniques in clinical records, as well as in the implementation of Machine Learning algorithms in the analysis of biomedical data. As a result, its educational approach will be characterized by combining solid theoretical foundations with practical applications, making it easier for graduates to understand complex concepts and their implementation in clinical contexts.

*The faculty is composed of experts with the ability to communicate clearly and effectively the principles and methods needed to harness the potential of AI in Clinical Research"*

## Management

### Dr. Peralta Martín-Palomino, Arturo

- CEO and CTO at Prometeus Global Solutions
- CTO at Korporate Technologies
- CTO at AI Shephers GmbH
- Consultant and Strategic Business Advisor at Alliance Medical
- Director of Design and Development at DocPath
- PhD. in Psychology from the University of Castilla La Mancha
- PhD in Economics, Business and Finance from the Camilo José Cela University
- PhD in Psychology from University of Castilla La Mancha
- Máster in Executive MBA por la Universidad Isabel I
- Master's Degree in Sales and Marketing Management, Isabel I University
- Expert Master's Degree in Big Data by Hadoop Training
- Master's Degree in Advanced Information Technologies from the University of Castilla La Mancha
- Member of: SMILE Research Group

### Mr. Popescu Radu, Daniel Vasile

- Pharmacology, Nutrition and Diet Specialist
- Freelance Producer of Teaching and Scientific Content
- Nutritionist and Community Dietitian
- Community Pharmacist
- Researcher
- Master's Degree in Nutrition and Health at the Open University of Catalonia
- Master's Degree in Psychopharmacology from the University of Valencia
- Pharmacist from the Complutense University of Madrid
- Nutritionist-Dietitian by the European University Miguel de Cervantes

## Professors

### Dr. Carrasco González, Ramón Alberto

- Specialist in Computer Science and Artificial Intelligence
- Researcher
- Head of Business Intelligence (Marketing) at the Caja General de Ahorros de Granada and Banco Mare Nostrum
- Head of Information Systems (Data Warehousing and Business Intelligence) at Caja General de Ahorros de Granada and Banco Mare Nostrum
- Doctor in Artificial Intelligence by the University of Granada
- Higher Engineering Degree in Computer Science from the University of Granada

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# Structure and Content

This academic program will delve into the key tools used in this field, immersing in data mining in clinical and biomedical records.
In addition, specific Machine Learning algorithms applied in biomedical research will be explored, using predictive analysis techniques to improve clinical diagnoses and prognoses. Likewise, AI models in epidemiology and public health will be analyzed, as well as the analysis of biological networks to understand disease patterns. Finally, you will develop predictive tools, advanced visualization skills and complex data communication, addressing the challenges of Big Data management in the medical field.

*You will analyze practical applications and case studies, offering a specific perspective on how AI directly impacts Clinical Research"*

## **Module 1.** Big Data Analytics and Machine Learning in Clinical Research

1.1. Big Data in Clinical Research: Concepts and Tools
- 1.1.1. The Explosion of Data in the Field of Clinical Research
- 1.1.2. Concept of Big Data and Main Tools
- 1.1.3. Applications of Big Data in Clinical Research

1.2. Data Mining in Clinical and Biomedical Registries
- 1.2.1. Main Methodologies for Data Mining
- 1.2.2. Data Integration of Clinical and Biomedical Registry Data
- 1.2.3. Detection of Patterns and Anomalies in Clinical and Biomedical Records

1.3. Machine Learning Algorithms in Biomedical Research
- 1.3.1. Classification Techniques in Biomedical Research
- 1.3.2. Regression Techniques in Biomedical Research
- 1.3.4. Unsupervised Techniques in Biomedical Research

1.4. Predictive Analytical Techniques in Clinical Research
- 1.4.1. Classification Techniques in Clinical Research
- 1.4.2. Regression Techniques in Clinical Research
- 1.4.3. Deep Learning in Clinical Research

1.5. AI Models in Epidemiology and Public Health
- 1.5.1. Classification Techniques for Epidemiology and Public Health
- 1.5.2. Regression Techniques for Epidemiology and Public Health
- 1.5.3. Unsupervised Techniques for Epidemiology and Public Health

1.6. Analysis of Biological Networks and Disease Patterns
- 1.6.1. Exploration of Interactions in Biological Networks for the Identification of Disease Patterns
- 1.6.2. Integration of Omics Data in Network Analysis to Characterize Biological Complexities
- 1.6.3. Application of Machine Learning Algorithms for the Discovery of Disease Patterns



1.7. Development of Tools for Clinical Prognosis
- 1.7.1. Creation of Innovative Clinical Prognostic Tools based on Multidimensional Data
- 1.7.2. Integration of Clinical and Molecular Variables in the Development of Prognostic Tools
- 1.7.3. Evaluating the Effectiveness of Prognostic Tools in Diverse Clinical Contexts

1.8. Advanced Visualization and Communication of Complex Data
- 1.8.1. Use of Advanced Visualization Techniques to Represent Complex Biomedical Data
- 1.8.2. Development of Effective Communication Strategies to Present Results of Complex Analyses
- 1.8.3. Implementation of Interactivity Tools in Visualizations to Enhance Understanding

1.9. Data Security and Challenges in Big Data Management
- 1.9.1. Addressing Data Security Challenges in the Context of Biomedical Big Data
- 1.9.1. Strategies for Privacy Protection in the Management of Large Biomedical Datasets
- 1.9.3. Implementation of Security Measures to Mitigate Risks in the Handling of Sensitive Data

1.10. Practical Applications and Case Studies on Biomedical Big Data
- 1.10.1. Exploration of Successful Cases in the Implementation of Biomedical Big Data in Clinical Research
- 1.10.2. Development of Practical Strategies for the Application of Big Data in Clinical Decision-Making
- 1.10.3. Evaluation of Impact and Lessons Learned through Case Studies in the Biomedical Field

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# Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning.**

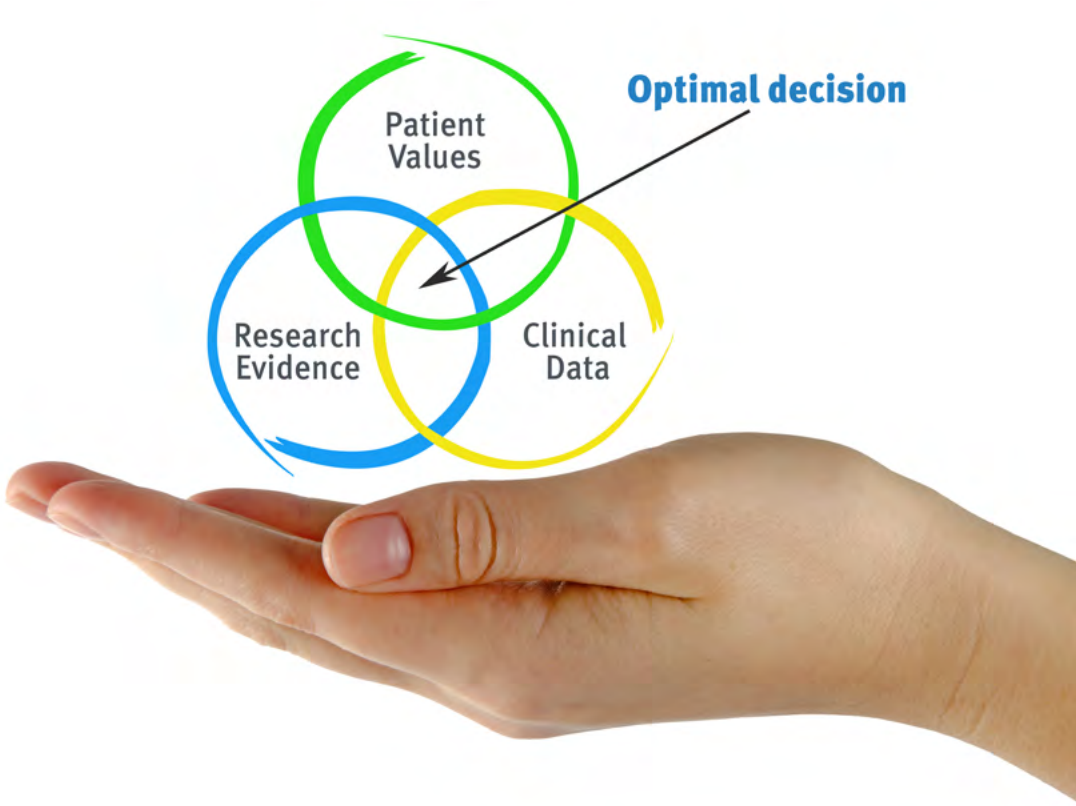
This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.

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

## At TECH we use the Case Method

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

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




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

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

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

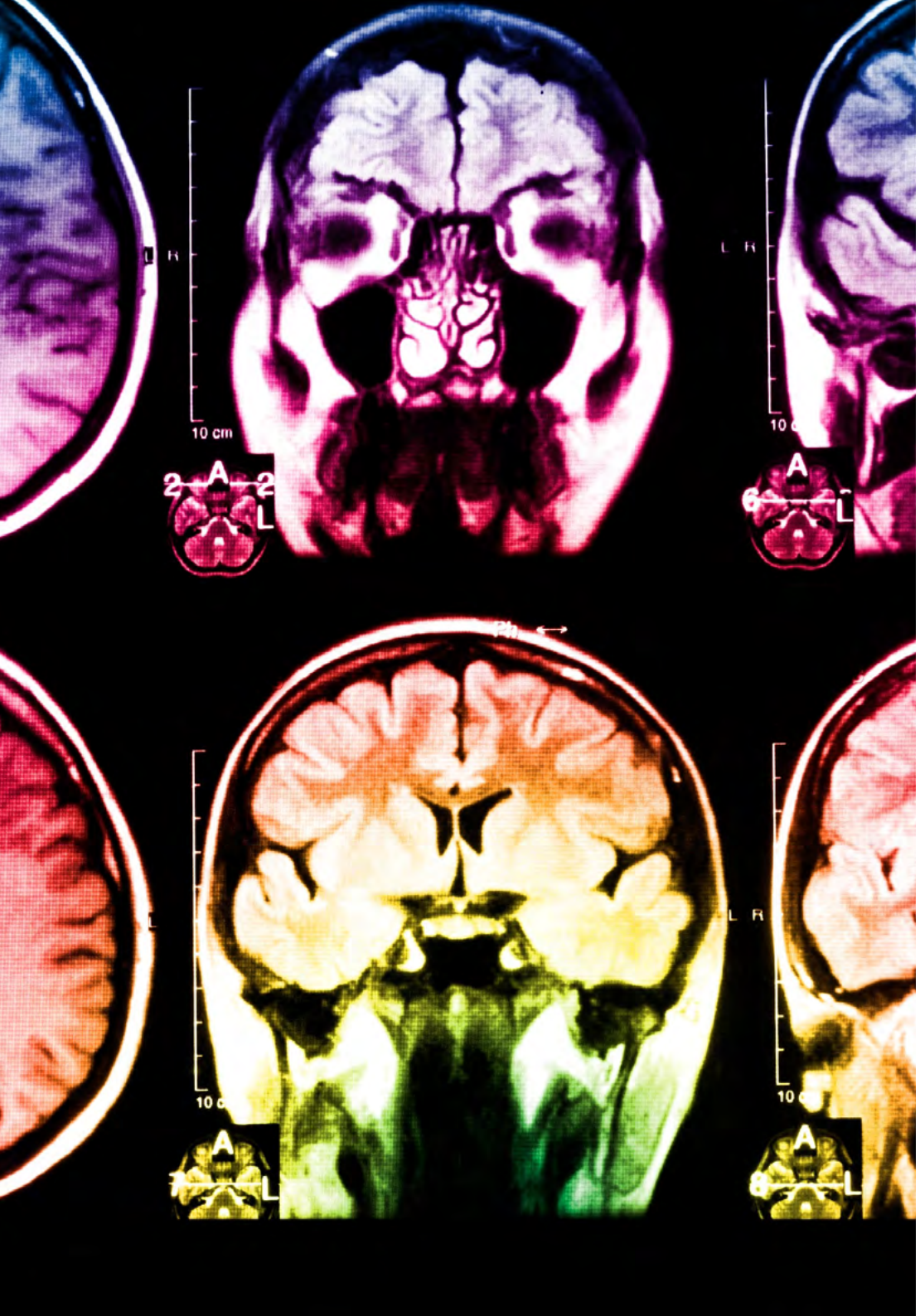
1. Students who follow this method not only achieve the assimilation of concepts, but also a development of their mental capacity, through exercises that evaluate real situations and the application of knowledge.
2. Learning is solidly translated into practical skills that allow the student to better integrate into the real world.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life.
4. Students like to feel that the effort they put into their studies is worthwhile. This then translates into a greater interest in learning and more time dedicated to working on the course.

## Relearning Methodology

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

This university is the first in the world to combine the study of clinical cases with a 100% online learning system based on repetition, combining a minimum of 8 different elements in each lesson, a real revolution with respect to the mere study and analysis of cases.

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

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

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

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

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

### Study Material

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

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

### Surgical Techniques and Procedures on Video

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

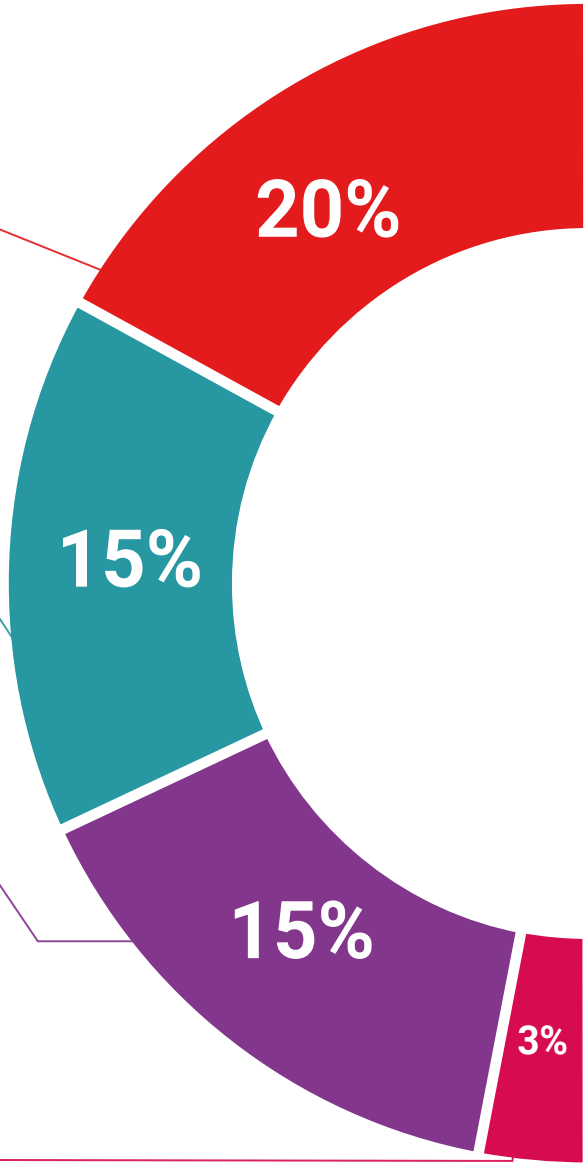
### Interactive Summaries

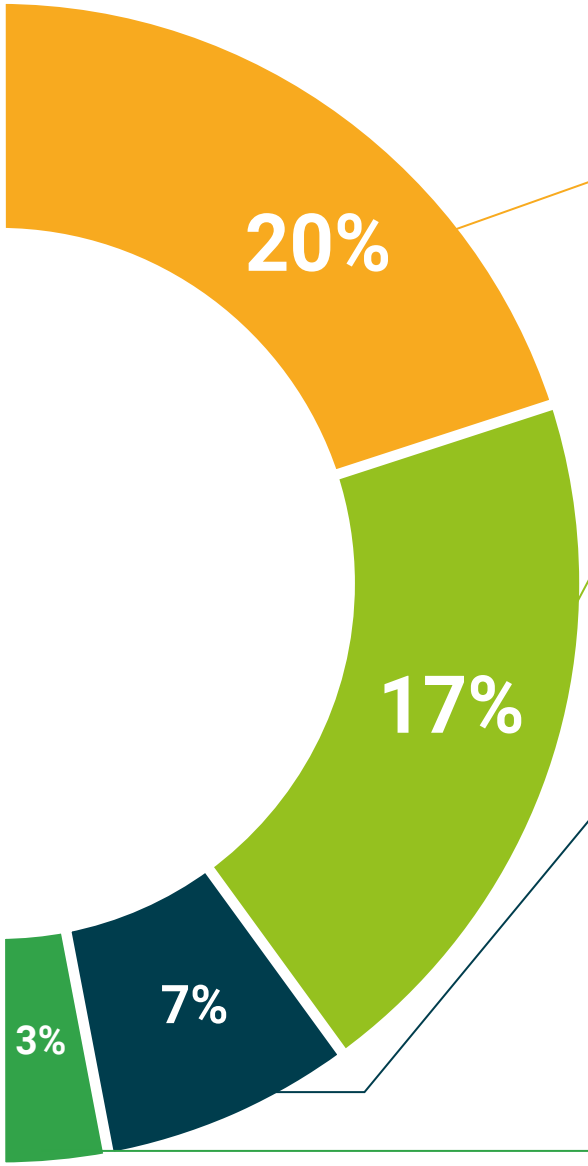
The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

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

### Additional Reading

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






### Expert-Led Case Studies and Case Analysis

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

### Testing & Retesting

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

### Classes

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

### Quick Action Guides

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

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# Certificate

The Postgraduate Certificate in Big Data Analytics and Machine Learning in Clinical Research guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Technological University.

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

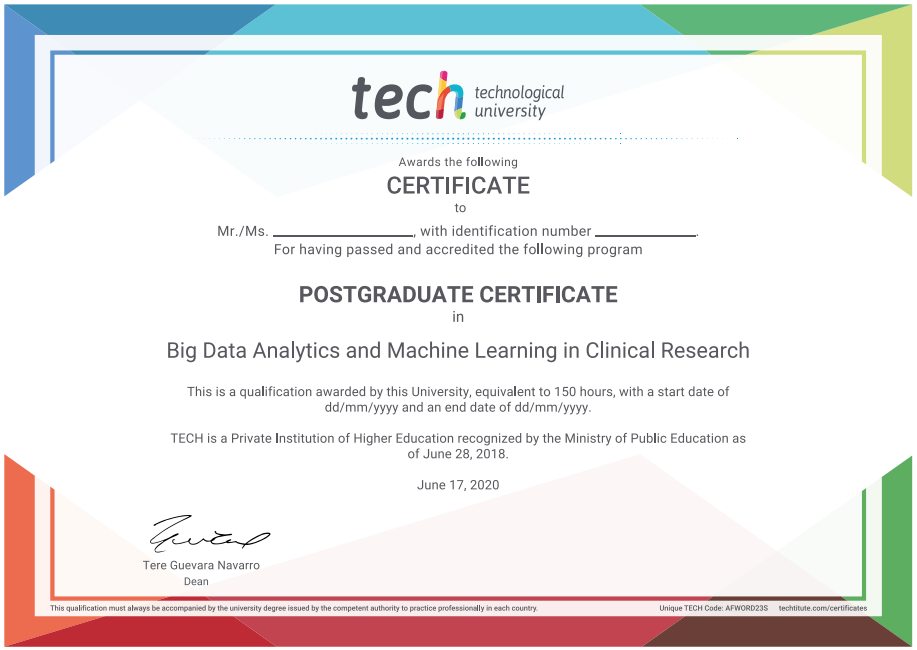
This **Postgraduate Certificate in Big Data Analytics and Machine Learning in Clinical Research** contains the most complete and up-to-date scientific  on the market.

After the student has passed the assessments, they will receive their corresponding **Postgraduate Certificate** issued by **TECH Technological University** via tracked delivery*.

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

Title: **Postgraduate Certificate in Big Data Analytics and Machine Learning in Clinical Research**

Official Nº of Hours: **150 h.**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Awards the following

CERTIFICATE

to

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

For having passed and accredited the following program

POSTGRADUATE CERTIFICATE

in

Big Data Analytics and Machine Learning in Clinical Research

This is a qualification awarded by this University, equivalent to 150 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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