

# Postgraduate Certificate Biostatistics with R



## Postgraduate Certificate Biostatistics with R

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

Website: [www.techtitute.com/pk/physiotherapy/postgraduate-certificate/biostatistics-r](http://www.techtitute.com/pk/physiotherapy/postgraduate-certificate/biostatistics-r)

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# 01

# Introduction

Statistics, on the other hand, allows us to obtain much more concrete data when it comes to clarifying the hypotheses of a study. In this sense, it is implemented as a key tool for empirical research. It may be the turning point between the Health Research of the past and that of the present and, therefore, it has gained great prominence in recent years. With it, the specialist can plan the research, collect, interpret and represent the information obtained and even analyze it by associating it with individuals or observations. Therefore, it is essential that professionals in this area of work, master the issues that encompass Statistics and R in health research. For this reason, TECH offers a 100% online program that delves into regression methods with R and multivariate analysis. A degree that offers students all the flexibility they need to make their studies compatible with other areas of their lives.



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*Upgrade your knowledge of regression methods for research with R in only 150 hours of academic instruction"*



Statistics allows the specialist to glimpse the obstacles that may be encountered in the development of the research, that is, it is capable of predicting by means of formulas the periods of study. However, it can also classify information, distribute it efficiently to create contextualized data, and analyze response behaviors associated with simulated cases with patients testing new treatments. It is a tool that facilitates the development of research by establishing the type of sampling, sample size and type of data collection, among other advantages.

TECH has designed this Postgraduate Certificate in Biostatistics with R for Pharmacy graduates and other professionals in the Health Sciences who wish to deepen their knowledge in the study of statistical data. All this, by means of an exhaustive approach to the statistical techniques of Data Mining with R, multivariate analysis with R and all the applications associated with this system. To achieve this, the program has a team of experienced teachers in the area who have the necessary knowledge to transmit all the contents of the subject. The main purpose of this study is to update the knowledge of physiotherapists by means of strategic tools.

It is a 100% online university degree, which allows access to all interested students wherever and whenever they wish. In this way, the program is adapted to the personal and professional needs of graduates in Physiotherapy and other health disciplines. In addition, the degree has theoretical-practical and additional materials, which the students will enjoy from the first module and which will make the study a flexible and dynamic process. In addition, TECH applies an innovative pedagogical system, based on the Relearning methodology, which will exempt specialists from long hours of memorization and will allow them to adapt the pace of study according to their possibilities, without depending on a pre-set schedule.

This **Postgraduate Certificate in Biostatistics with R** contains the most complete and up-to-date scientific program on the market. The most important features include:

- ◆ Development of case studies presented by experts in Medical 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
- ◆ The availability of access to content from any fixed or portable device with an Internet connection



*Dive into Data Mining with R and discover how data mining can foster knowledge generation around your research findings”*

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*Attend to the advances in Biostatistics so that you can apply them in your research projects and promote their performance"*

The program's teaching staff includes professionals from the sector who contribute their work experience to this educational program, as well as renowned specialists from leading societies and prestigious universities.

Its 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 education programmed to learn in real situations.

The design of this program focuses on Problem-Based Learning, by means of which the professional must try to solve the different professional practice situations that are presented throughout the academic course. For this purpose, the student will be assisted by an innovative interactive video system created by renowned experts.

*With TECH you will not have to do without other areas of your life and you will be able to combine your studies with your current job, among other activities.*

*Delve into the R program and regression methods and be part of the group of experts at the forefront of physiotherapeutic research.*



# 02 Objectives

The main objective of this Postgraduate Certificate in Biostatistics with R is to offer students the most updated content on statistical data mining techniques. In this way, the specialist will follow a dynamic and innovative program that will allow them to update their knowledge in only 150 hours. In addition, it also aims to endow you with academic tools that do not only guarantee your instruction, but also encourage you to improve your professional skills in a 100% online way.





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*It explores multivariate analysis and the new scientific methods associated with statistics so that you can boost the development of your own trials and those in which you collaborate"*



## General Objectives

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- ◆ Adequately formulate a question or problem to be solved
- ◆ Asses the state of the art of the problem through literature search
- ◆ Assess the feasibility of the potential project
- ◆ Draft projects in accordance with the different calls for proposals
- ◆ Look for A Funding Model
- ◆ Master the necessary data analysis tools
- ◆ Write scientific articles (papers) for the daily magazines.
- ◆ Identify the main tools for dissemination to the non-specialized public.



*Achieve your goals with a program that adapts to you and your needs so you can study remotely 100% online, depending only on an electronic device and internet connection"*





## Specific objectives

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- ◆ Describe the main concepts of biostatistics
- ◆ Learn how to use the R program
- ◆ Define and understand the regression method and multivariate analysis with R
- ◆ Explore regression methods applied to research.
- ◆ Recognize the concepts of statistics applied to research
- ◆ Describe the statistical techniques of data mining
- ◆ Provide knowledge of the most commonly used statistical techniques in biomedical research.



03

# Course Management

TECH has called upon an expert teaching team in Medical Research with great professionalism and human qualities. These experts have been in charge of developing the contents of the degree and also of transmitting their knowledge. In this way, the students will not only enjoy a theoretical syllabus, but will acquire, from the hand of professionals with years of experience, the keys to the development of Statistics applied to Physiotherapeutic Research.



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*You will actively participate in the updating of your knowledge, thanks to the attention offered by the expert teachers who teach this degree and who have been carefully selected to enrich your learning"*



## Management



### Dr. López-Collazo, Eduardo

- ♦ Scientific Deputy Director in the Institute for Health Research the Health Research Institute of La Paz University Hospital
- ♦ Head of the Department of Inmune Response and Infectious Diseases at IdiPAZ
- ♦ Head of the Department of Inmune Response, Tumors and Immunology at IdiPAZ
- ♦ President of the IdiPAZ Research Commission
- ♦ Sponsor of the External Scientific Committee of the Murcian Institute of Health Research
- ♦ Member of the Scientific Commission of FIDE
- ♦ Editor of the international scientific journal "Mediators of Inflammation"
- ♦ Editor of the international scientific journal "Frontiers of Immunology"
- ♦ Coordinator of IdiPAZ Platforms
- ♦ Coordinator of Health Research Funds in the areas of Cancer, Infectious Diseases and HIV
- ♦ PhD in Nuclear Physics, University of La Habana
- ♦ Doctorate in Pharmacy from the Complutense University of Madrid



## Professors

### Mr. Arnedo Abad, Luis

- ◆ Data & Analyst Manager
- ◆ Data Scientist & Analyst Manager in Industrias Arnedo
- ◆ Data & Analyst Manager in Boustique Perfumes
- ◆ Data Scientist & Analyst Manager in Darecod
- ◆ Postgraduate Certificate in Statistics
- ◆ Psychology Graduate

# 04

## Structure and Content

The structure and content of this Postgraduate Certificate in Biostatistics with R have been developed by the teaching team, following the rigorous guidelines pursued by TECH teaching. In addition, the contents have integrated the most comprehensive developments in the field of physiotherapy and the application of statistics in this area. In addition, the Relearning methodology has been used in its development, which exempts professionals from long hours of memorization so that they can assimilate the contents in a simple and gradual manner. A modern experience for those who wish to perfect their skills through a 100% online qualification.



A close-up photograph of a microscope's objective lens and eyepiece, showing the intricate metal components and glass lenses. The background is a blurred white lab coat and blue fabric, suggesting a clinical or laboratory setting.

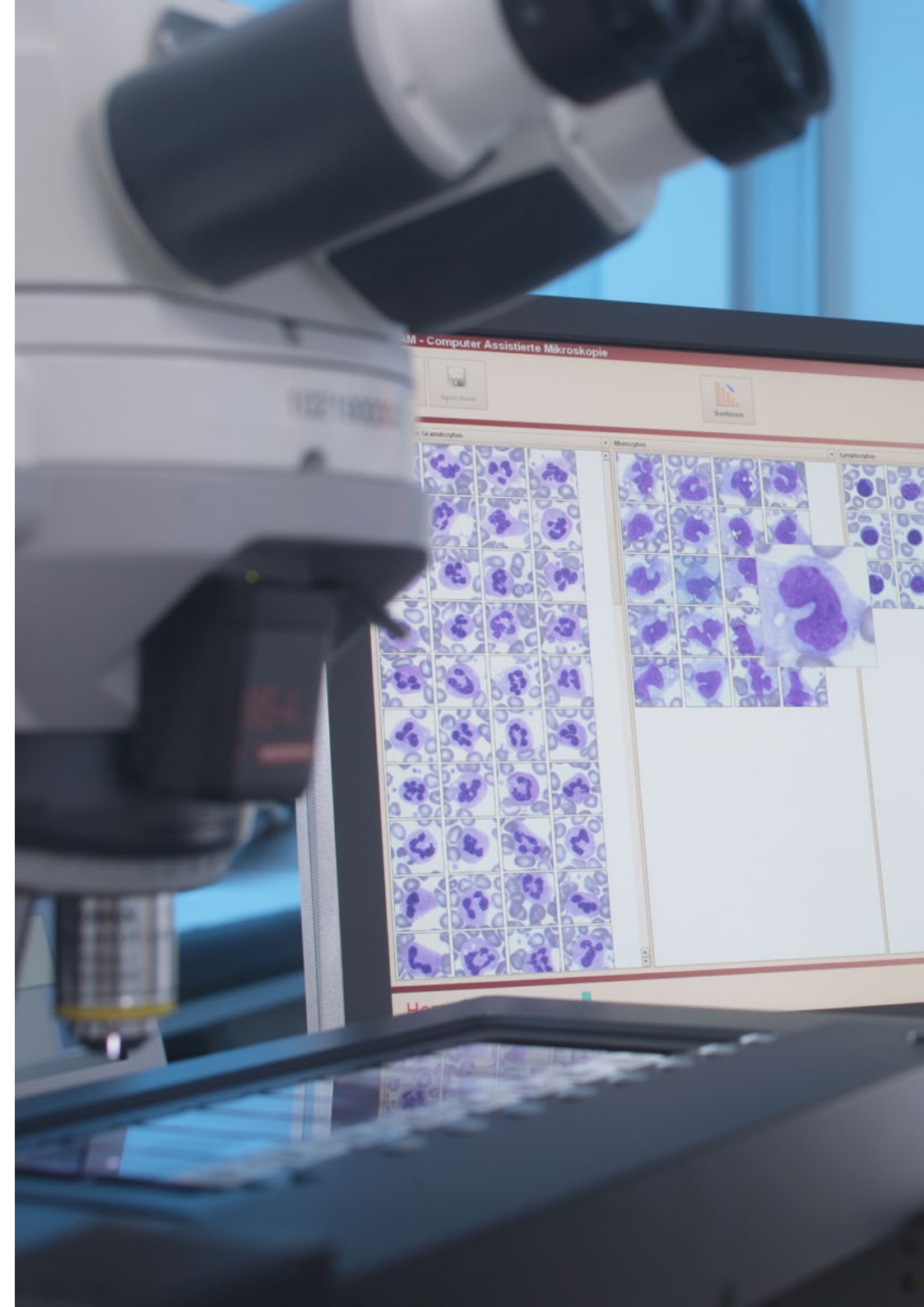
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*Be involved in the development of new scientific methods around the application of R and understand how it can exponentially improve the Physiotherapy Research process"*

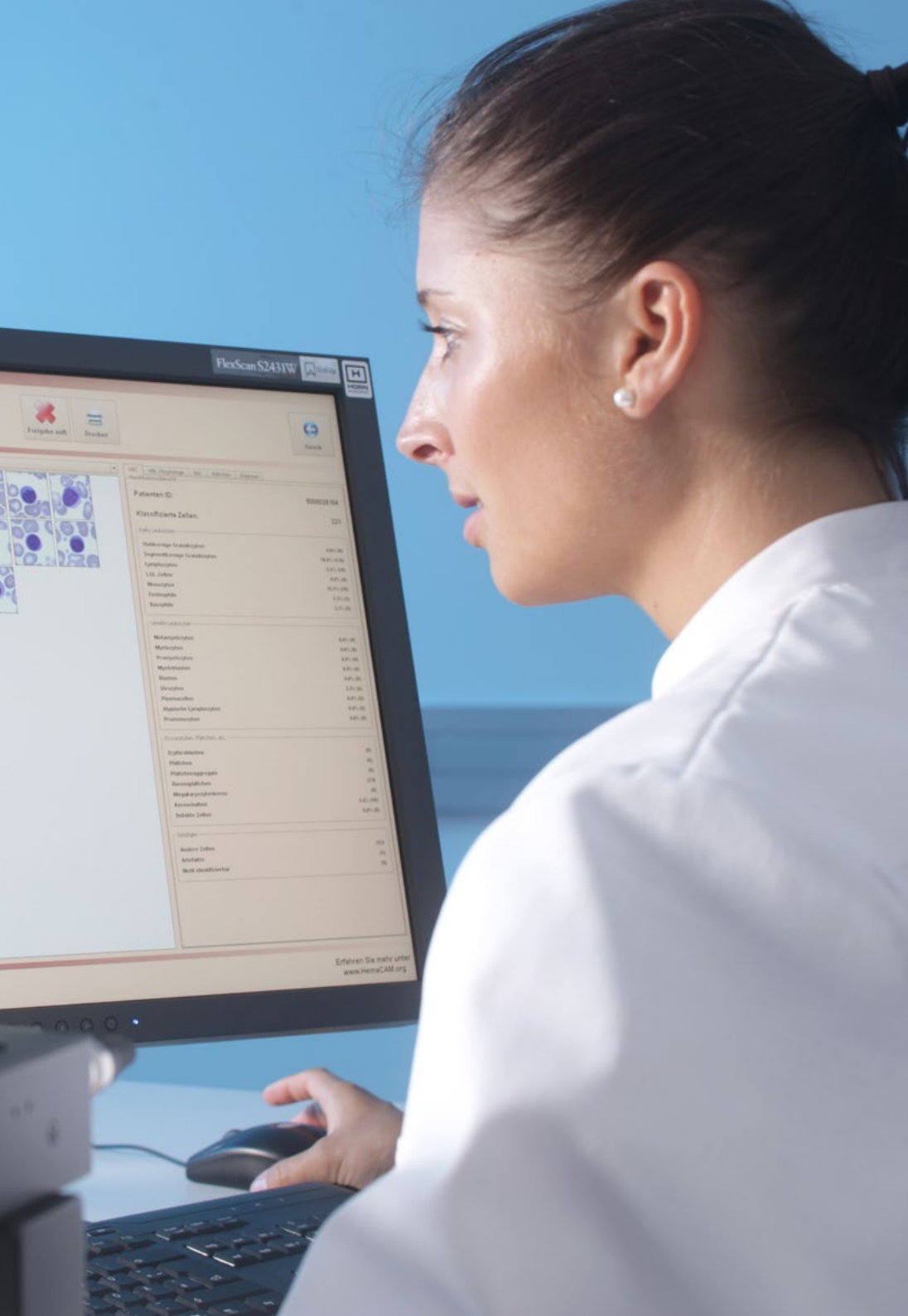


## Module 1. Statistics and R in Health Research

- 1.1. Biostatistics
  - 1.1.1. Introduction to The Scientific Method
  - 1.1.2. Population and Sample. Sampling Measures of Centralization
  - 1.1.3. Discrete Distributions and Continuous Distributions
  - 1.1.4. General Outline of Statistical Inference. Inference about a Normal Population Mean. Inference about a General Population Mean
  - 1.1.5. Introduction to Nonparametric Inference
- 1.2. Introduction to R
  - 1.2.1. Basic Features of the Program
  - 1.2.2. Main Object Types
  - 1.2.3. Simple Examples of Simulation and Statistical Inference
  - 1.2.4. Graphs
  - 1.2.5. Introduction to R Programming
- 1.3. Regression Methods with R
  - 1.3.1. Regression Models
  - 1.3.2. Variable Selection
  - 1.3.3. Model Diagnosis
  - 1.3.4. Treatment of Outliers
  - 1.3.5. Regression Analysis
- 1.4. Multivariate Analysis with R
  - 1.4.1. Description of Multivariate Data
  - 1.4.2. Multivariate Distributions
  - 1.4.3. Dimension Reduction
  - 1.4.4. Unsupervised Classification: Cluster Analysis
  - 1.4.5. Supervised Classification: Discriminant Analysis
- 1.5. Regression Methods for Research with R
  - 1.5.1. Generalized Linear Models (GLM): Poisson Regression and Negative Binomial Regression
  - 1.5.2. Generalized Linear Models (GLM): Logistic and Binomial Regressions
  - 1.5.3. Poisson and Negative Binomial Regression Inflated by Zeros
  - 1.5.4. Local Fits and Generalized Additive Models (GAMs)
  - 1.5.5. Generalized Mixed Models (GLMM) and Generalized Additive Mixed Models (GAMM)







- 1.6. Statistics Applied to Biomedical Research with R I
  - 1.6.1. Basic Notions of R. Variables and Objects in R. Data handling. Files Graphs
  - 1.6.2. Descriptive Statistics and Probability Functions
  - 1.6.3. Programming and Functions in R
  - 1.6.4. Contingency Table Analysis
  - 1.6.5. Basic Inference with Continuous Variables
- 1.7. Statistics Applied to Biomedical Research with R II
  - 1.7.1. Analysis of Variance
  - 1.7.2. Correlation Analysis
  - 1.7.3. Simple Linear Regression
  - 1.7.4. Multiple Linear Regression
  - 1.7.5. Logistic Regression
- 1.8. Statistics Applied to Biomedical Research with R III
  - 1.8.1. Confounding Variables and Interactions
  - 1.8.2. Construction of a Logistic Regression Model
  - 1.8.3. Survival Analysis
  - 1.8.4. Cox Regression
  - 1.8.5. Predictive Models. ROC Curve Analysis
- 1.9. Statistical *Data Mining* Techniques with R I
  - 1.9.1. Introduction. *Data Mining*. Supervised and Unsupervised Learning. Predictive Models Classification and Regression
  - 1.9.2. Descriptive Analysis Data Pre-Processing
  - 1.9.3. Principal Component Analysis (PCA)
  - 1.9.4. Cluster Analysis. Hierarchical Methods. K-Means
- 1.10. Statistical *Data Mining* Techniques with R II
  - 1.10.1. Model Evaluation Measures. Predictive Ability Measures. ROC Curves
  - 1.10.2. Models Assessment Techniques. Cross-Validation. Bootstrap Samples
  - 1.10.3. Tree-Based Methods (CART)
  - 1.10.4. Support Vector Machines (SVM)
  - 1.10.5. Random Forest (RF) and Neural Networks (NN)

# 05 Methodology

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

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





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*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. Physiotherapists/kinesiologists 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 of professional physiotherapy practice.



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*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. Physiotherapists/kinesiologists 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 physiotherapist/kinesiologist 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.



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

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

With this methodology we trained more than 65,000 physiotherapists/kinesiologists with unprecedented success in all clinical specialties, regardless of the workload. 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 training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for 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 our 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 really 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.



#### Physiotherapy Techniques and Procedures on Video

TECH brings students closer to the latest techniques, the latest educational advances and to the forefront of current Physiotherapy techniques and procedures. 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 them as many times as you want.



#### 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.

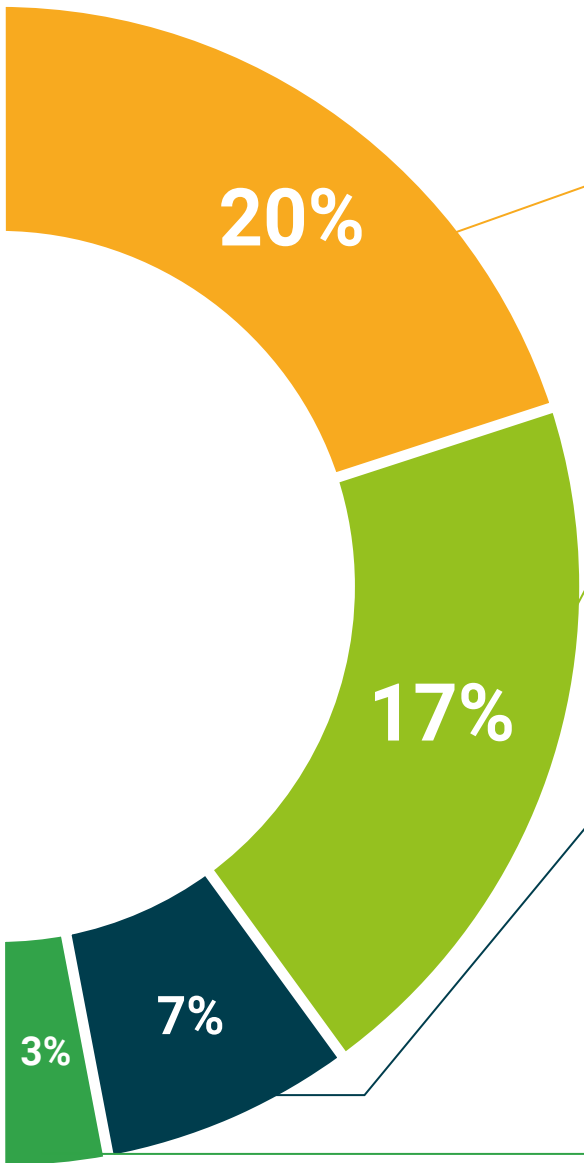
This unique multimedia content presentation training system was awarded by Microsoft as a "European Success Story".



#### Additional Reading

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





**Expert-Led Case Studies and Case Analysis**

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



**Testing & Retesting**

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



**Classes**

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



**Quick Action Guides**

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





# 06 Certificate

The Postgraduate Certificate in Biostatistics with R guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Technological University.





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*Successfully complete this training and receive your university degree without travel or cumbersome paperwork"*

This **Postgraduate Certificate in Biostatistics with R** contains the most complete and up-to-date scientific program 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 Biostatistics with R**

Official N° of Hours: **150 h.**



\*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 Certificate

## Biostatistics with R

