

# Postgraduate Diploma

## Tools for Health Research



## Postgraduate Diploma Tools for Health Research

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

Website: [www.techtute.com/us/pharmacy/postgraduate-diploma/postgraduate-diploma-tools-health-research](http://www.techtute.com/us/pharmacy/postgraduate-diploma/postgraduate-diploma-tools-health-research)

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# 01

# Introduction

Medicines have been developed thanks to numerous studies by specialists in the sector who have been equipped with the data to know the adverse effects on individuals, as well as the biological response to the medicine. Thus, pharmaceutical companies focus on health problems in the population and the implementation of these services in order to alleviate the pathologies of those affected. To promote scientific evolution in this area, TECH has developed a program to teach professionals about epidemiology and quality protocols that maximize medicine effectiveness. All this, through a 100% online program that allows students to adapt the pace of study to their needs.



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*With this Postgraduate Diploma, you will gain all the knowledge required about new research tools so you can keep up with the demands of the sector”*



Incremental innovation justifies the scrutiny that some drugs undergo when they are marketed. In order to obtain the "flagship product", some societies have undervalued the pharmaceutical work in the market. On occasions, drugs that affected the health of individuals had to be removed from the market. An example of this is the temporary suspension of cerivastatin, at the request of the pharmaceutical laboratory Bayer, S.A., for causing kidney damage to those who consumed it.

In this sense, it is essential that pharmaceutical companies have personnel who have a thorough understanding of the action protocols, act under professional ethics and, above all, are constantly updated. To meet the qualification requirements in the labor market, TECH has developed a rigorous program that explores the management of clinical information, which is key to the management of the social and health field, as well as research and the publication of articles, theses and applied reports. In this way, specialists will increase their competitiveness in the labor market by gaining new knowledge about research.

It is a 100% online program that allows them to study the subject without neglecting other activities of the specialists' daily lives, such as their jobs. In addition, TECH applies the Relearning methodology to exempt students from long hours of memorization and allow them assimilating the contents in a gradual and constant manner. By taking this program, professionals will have the support of a teaching team of specialists who have been awarded several prizes in the health sector.

This **Postgraduate Diploma in Tools for Health Research** contains the most complete and up-to-date scientific program on the market. The most important features include:

- ◆ Development of practical case studies presented by experts in health sciences
- ◆ The graphic, schematic, and practical contents with which they are created, provide medical information on the disciplines that are essential for professional practice
- ◆ Practical exercises where self-assessment can be used 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



*The overall structure of a project is key to its performance. Learn about the correct generation of scientific studies to understand the level of impact of their backgrounds"*

“*Now you can be part of the professionals at the forefront of studies in pharmaceuticals, thanks to the theoretical-practical knowledge you will obtain with TECH*”

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 allow professionals to learn in a contextual and situated learning environment, i.e., a simulated environment that will provide immersive education programmed to prepare in real situations.

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

*Master the ROC Curves and the types of multiple regression analysis to apply to your studies and offer a more accurate service.*

*Statistics and R are key in research in health sciences. Delve into this field managing population data and working with samples with guaranteed success.*



# 02 Objectives

This Professional Postgraduate Diploma in Tools for Health Research aims to provide all the knowledge in research to doctors and other professionals interested. To do so, this program delves into the interpretation of information and the use of basic statistical tools, as well as the scientific methodology integrated by companies specialized in field work. In addition, TECH has incorporated theoretical-practical materials to make the study of professionals more dynamic and facilitate their instruction.





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*Meet your goals: be part of the evolution of clinical research projects thanks to the simulation and statistical inference examples offered by TECH"*



## General Objectives

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- ◆ Understand the appropriate approach to a question or problem to be solved
- ◆ Assess the state of the art of the problem through literature search
- ◆ Assess the feasibility of the potential project
- ◆ Study the drafting of a project in accordance with the different calls for proposals
- ◆ Examine the search for funding
- ◆ Master the necessary data analysis tools
- ◆ Write scientific articles (papers) for the daily magazines
- ◆ Generate posters relevant to the units covered
- ◆ Know the tools for dissemination to the non-specialized public
- ◆ Delve into data protection
- ◆ Understand the transfer of knowledge generated to industry or the clinic
- ◆ Examine the current use of artificial intelligence and massive data analysis
- ◆ Study examples of successful projects



*Would you like to update your pharmaceutical knowledge to perform multivariate analysis with R? Enrich your professional career, thanks to the rigorous knowledge that you will get with TECH"*





## Specific Objectives

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### Module 1. Generation of Research Projects

- ◆ Learn how to assess the feasibility of the potential project
- ◆ Know in depth the essential milestones for writing a research project
- ◆ Delve into the criteria for exclusion/inclusion in projects
- ◆ Learn how to set up the specific team for each project

### Module 2. Statistics and R in Health Research

- ◆ Describe the main concepts of biostatistics
- ◆ Learn how to use the R program
- ◆ Define and understand the regression method and multivariate analysis with R
- ◆ 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

### Module 3. Graphical Representations of Data in Health Research and Other Advanced Analysis

- ◆ Master the tools of computational statistics
- ◆ Learn to generate graphs for the visual interpretation of data obtained in research project
- ◆ Delve into the dimensionality reduction methods
- ◆ Delve into the comparison of methods



03

# Course Management

TECH has called on a group of teachers experienced in the pharmaceutical field and who have worked in Health Research for years. This is a meticulous choice that provides students with possibilities, since, thanks to the collaboration of these professionals, they will not only obtain theoretical content. On the contrary, students will be able to deepen their practical experience, thanks to the simulation of real cases and the reliable knowledge of the specialists themselves acquired in the clinical trial scenario.



“

*TECH has specialists in the area whom you can contact through a direct communication channel using the Virtual Campus with which you will solve all your questions about the subject"*



## Management



### Dr. López-Collazo, Eduardo

- ♦ Head of the Department of Immune Response and Infectious Diseases at IdiPAZ
- ♦ Head of the Department of Immune 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

### Dr. Avendaño Ortiz, José

- ◆ "Sara Borrell" Researcher Foundation for Biomedical Research of the Ramón y Cajal University Hospital (FIBioHRC/IRyCIS)
- ◆ Researcher Foundation for Biomedical Research of La Paz University Hospital (FIBHULP/ IdiPAZ)
- ◆ Researcher HM Hospitals Foundation (FIHM)
- ◆ Graduate in Biomedical Sciences from the University of Lleida
- ◆ Master's Degree in pharmacological research from the Autonomous University of Madrid
- ◆ PhD in Pharmacology and Physiology from the Autonomous University of Madrid

### 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

### Dr. Pascual Iglesias, Alejandro

- ◆ Bioinformatics Platform Coordinator, La Paz Hospital
- ◆ Advisor to the COVID-19 Expert Committee of Extremadura
- ◆ Researcher in Eduardo López-Collazo's innate immune response research group, Instituto de Investigación Sanitarias University Hospital La Paz
- ◆ Researcher in the coronavirus research group of Luis Enjuanes, National Center of Biotechnology CNB-CSIC
- ◆ Coordinator of Continuing Education in Bioinformatics, Health Research Institute of the University Hospital La Paz
- ◆ Cum Laude Doctor in Molecular Biosciences from the Autonomous University of Madrid
- ◆ Degree in Biology Molecular from the University of Salamanca
- ◆ Professional Master's Degree in Cellular and Molecular Physiopathology and Pharmacology from the Universidad of Salamanca

# 04

# Structure and Content

The syllabus of this Postgraduate Diploma in Tools for Health Research has been developed by experts in health sciences in order to guarantee the correct instruction of the students. Thus, TECH offers a program that explores the generation of research projects, statistics and R in health research and graphical representations of data, among many other issues. All this, in a simple way thanks to the innovative Relearning methodology, which will exempt students from long hours of study, turning it into a constant learning based on theoretical and practical exercises.



“

*Enroll now and stay in line with the statistical update. With TECH you will use innovative tools such as GLM and GAMM”*

## Module 1. Generation of Research Projects

- 1.1. General Structure of a Project
- 1.2. Presentation of Background and Preliminary Data
- 1.3. Definition of the Hypothesis
- 1.4. Definition of General and Specific Objectives
- 1.5. Definition of the Type of Sample, Number and Variables to be Measured
- 1.6. Establishment of the Scientific Methodology
- 1.7. Exclusion/Inclusion Criteria in Projects with Human Samples
- 1.8. Establishment of the Specific Team: Balance and Expertise
- 1.9. Expectations: An Important Element that we Forget
- 1.10. Budget Generation: A fine Tuning Between the Needs and the Reality of the Call
- 1.11. Ethical Aspects

## Module 2. Statistics and R in Health Research

- 2.1. Biostatistics
  - 2.1.1. Introduction to The Scientific Method
  - 2.1.2. Population and Sample. Sampling Measures of Centralization
  - 2.1.3. Discrete Distributions and Continuous Distributions
  - 2.1.4. General Outline of Statistical Inference. Inference about a Normal Population Mean. Inference about a General Population Mean
  - 2.1.5. Introduction to Nonparametric Inference
- 2.2. Introduction to R
  - 2.2.1. Basic Features of the Program
  - 2.2.2. Main Object Types
  - 2.2.3. Simple Examples of Simulation and Statistical Inference
  - 2.2.4. Graphs
  - 2.2.5. Introduction to R Programming
- 2.3. Regression Methods with R
  - 2.3.1. Regression Models
  - 2.3.2. Variable Selection
  - 2.3.3. Model Diagnosis
  - 2.3.4. Treatment of Outliers
  - 2.3.5. Regression Analysis
- 2.4. Multivariate Analysis with R
  - 2.4.1. Description of Multivariate Data
  - 2.4.2. Multivariate Distributions
  - 2.4.3. Dimension Reduction
  - 2.4.4. Unsupervised Classification: Cluster Analysis
  - 2.4.5. Supervised Classification: Discriminant Analysis
- 2.5. Regression Methods for Research with R
  - 2.5.1. Generalized Linear Models (GLM): Poisson Regression and Negative Binomial Regression
  - 2.5.2. Generalized Linear Models (GLM): Logistic and Binomial Regressions
  - 2.5.3. Poisson and Negative Binomial Regression Inflated by Zeros
  - 2.5.1. Local Fits and Generalized Additive Models (GAMs)
  - 2.5.1. Generalized Mixed Models (GLMM) and Generalized Additive Mixed Models (GAMM)
- 2.6. Statistics Applied to Biomedical Research with R I
  - 2.6.1. Basic Notions of R. Variables and Objects in R. Data handling. Files Graphs
  - 2.6.2. Descriptive Statistics and Probability Functions
  - 2.6.3. Programming and Functions in R
  - 2.6.4. Contingency Table Analysis
  - 2.6.5. Basic Inference with Continuous Variables
- 2.7. Statistics Applied to Biomedical Research with R II
  - 2.7.1. Analysis of Variance
  - 2.7.2. Correlation Analysis
  - 2.7.3. Simple Linear Regression
  - 2.7.4. Multiple Linear Regression
  - 2.7.5. Logistic Regression
- 2.8. Statistics Applied to Biomedical Research with R III
  - 2.8.1. Confounding Variables and Interactions
  - 2.8.2. Construction of a Logistic Regression Model
  - 2.8.3. Survival Analysis
  - 2.8.4. Cox Regression
  - 2.8.5. Predictive Models. ROC Curve Analysis



- 2.9. Statistical Data Mining Techniques with R I
  - 2.9.1. Introduction. Data Mining. Supervised and Unsupervised Learning. Predictive Models. Classification and Regression
  - 2.9.2. Descriptive Analysis. Data Pre-Processing
  - 2.9.3. Principal Component Analysis (PCA)
  - 2.9.4. Cluster Analysis. Hierarchical Methods. K-Means
- 2.10. Statistical Data Mining Techniques with R II
  - 2.10.1. Model Assessment Measures. Predictive Ability Measures. ROC Curves
  - 2.10.2. Models Assessment Techniques. Cross-Validation. Bootstrap Samples
  - 2.10.3. Tree-Based Methods (CART)
  - 2.10.4. Support Vector Machines (SVM)
  - 2.10.5. Random Forest (RF) and Neural Networks (NN)

### Module 3. Graphical Representations of Data in Health Research and Other Advanced Analysis

- 3.1. Types of Graphs
- 3.2. Survival Analysis
- 3.3. ROC Curves
- 3.4. Multivariate Analysis (Types of Multiple Regression)
- 3.5. Binary Regression Models
- 3.6. Massive Data Analysis
- 3.7. Dimensionality Reduction Methods
- 3.8. Comparison of Methods: PCA, PPCA and KPCA
- 3.9. T-SNE (t-Distributed Stochastic Neighbor Embedding)
- 3.10. UMAP (Uniform Manifold Approximation and Projection)



*A program designed to master your skills and obtain innovative techniques and strategies in the field of research"*

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.





*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 be confronted with multiple simulated clinical cases based on real patients, in which they will have to investigate, establish hypotheses and ultimately, resolve the situation. There is an abundance of scientific evidence on the effectiveness of the method. Pharmacists learn better, more quickly 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. Gervas, 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, attempting to recreate the actual conditions in a pharmacist's professional 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. Pharmacists who follow this method not only grasp concepts, but also develop their mental capacity, by evaluating real situations and applying their 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.

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.

*Pharmacists 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, more than 115,000 pharmacists have been trained with unprecedented success in all clinical specialties, regardless of the surgical load. This pedagogical methodology is developed in a highly demanding environment, with a university student body with a high socioeconomic profile and an average age of 43.5 years.

*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 created specifically for the course by specialist pharmacists who will be teaching the course, so that the didactic development is highly specific and accurate.

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.



### Video Techniques and Procedures

TECH introduces students to the latest techniques, to the latest educational advances, to the forefront of current pharmaceutical care procedures. All of this, first hand, and explained and detailed with precision to contribute to assimilation and a better understanding. And best of all, you can watch them as many times as you want.



### Interactive Summaries

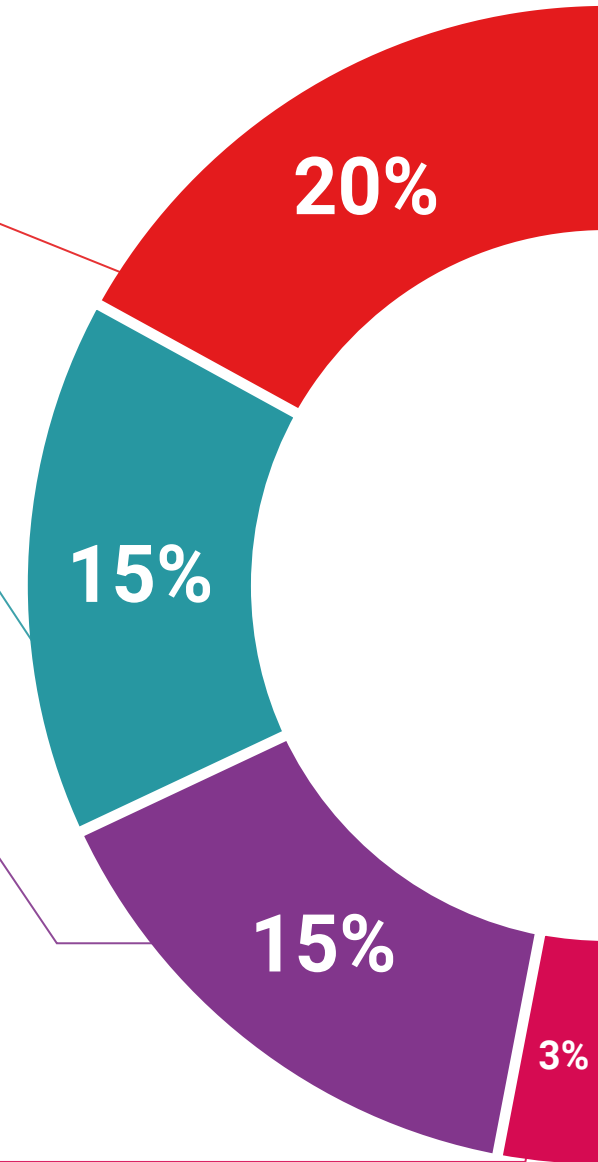
The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

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, 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 & 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 Diploma in Tools for Health Research guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Diploma 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 Diploma in Tools for Health Research** 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 Diploma**, issued by **TECH Technological University** via tracked delivery\*.

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

Title: **Postgraduate Diploma in Tools for Health Research**

Official N° of Hours: **450 h.**



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

future  
health confidence people  
education information tutors  
guarantee accreditation teaching  
institutions technology learning  
community commitment  
personalized service innovation  
knowledge present quality  
development language  
virtual classroom



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