

# 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/pk/dentistry/postgraduate-diploma/postgraduate-diploma-tools-health-research](http://www.techtute.com/pk/dentistry/postgraduate-diploma/postgraduate-diploma-tools-health-research)

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# 01

# Introduction

Dental techniques are advancing extremely quickly thanks to the technological and research boost something unthinkable years ago. This development makes it possible to achieve excellent results, both in the functionality of the methods and the results in patients. For this reason, it is necessary for dentists to be up to date with the latest research, which justifies the creation of this program. Throughout this program, the dentists will delve into the use of statistics as a key to generate averages and samples, regression models, analysis of different types and even the representation of these data obtained in graphs of different nature All this in a 100% online format, convenient and accessible from any device with an internet connection.





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*With this Postgraduate Diploma, you will obtain the necessary knowledge to conduct Health Investigations in the most efficient way”*

When conducting any type of activity, the processes, methods and instruments used will make a difference not only in the way it is carried out, but also in the results that can be obtained. For better or worse, all this will have a direct influence. Thus, and specifically in dentistry, research is seeking to improve the quality of products, mechanics and protocols of action by professionals seeking to expand their knowledge and skills in this field.

Nowadays, the methods used in the dental office have changed a lot compared to what was known only a few decades ago. These improvements have been achieved thanks to those work teams focused on researching and seeking new limits as far as the possibilities of dentistry are concerned. Thus, the optimization of research protocols is essential, since they represent an extremely important saving of time, money and human effort.

Taking this need into account when looking for the most correct and exhaustive research possible, TECH Technological University has developed a study plan where the students will receive all the necessary contents to be a reference in research efficiency, updating their knowledge and differentiating themselves as specialists in the sector.

As mentioned above, and seeking to offer a unique program, TECH Technological University presents this Postgraduate Diploma, 100% online, where students can study from anywhere in the world, without time restrictions or limits. Thus, the educational program adapts to the students, achieving a previously unimaginable convenience.

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:

- ♦ The development of case studies presented by experts in the use of Health Research Tools
- ♦ 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



*Improve your skills when undertaking research projects. Supported by a rigorous and exhaustive syllabus"*





*The creation of graphs from the results obtained from research is key in the research process. Update your knowledge and apply it to your practice all the details of this field"*

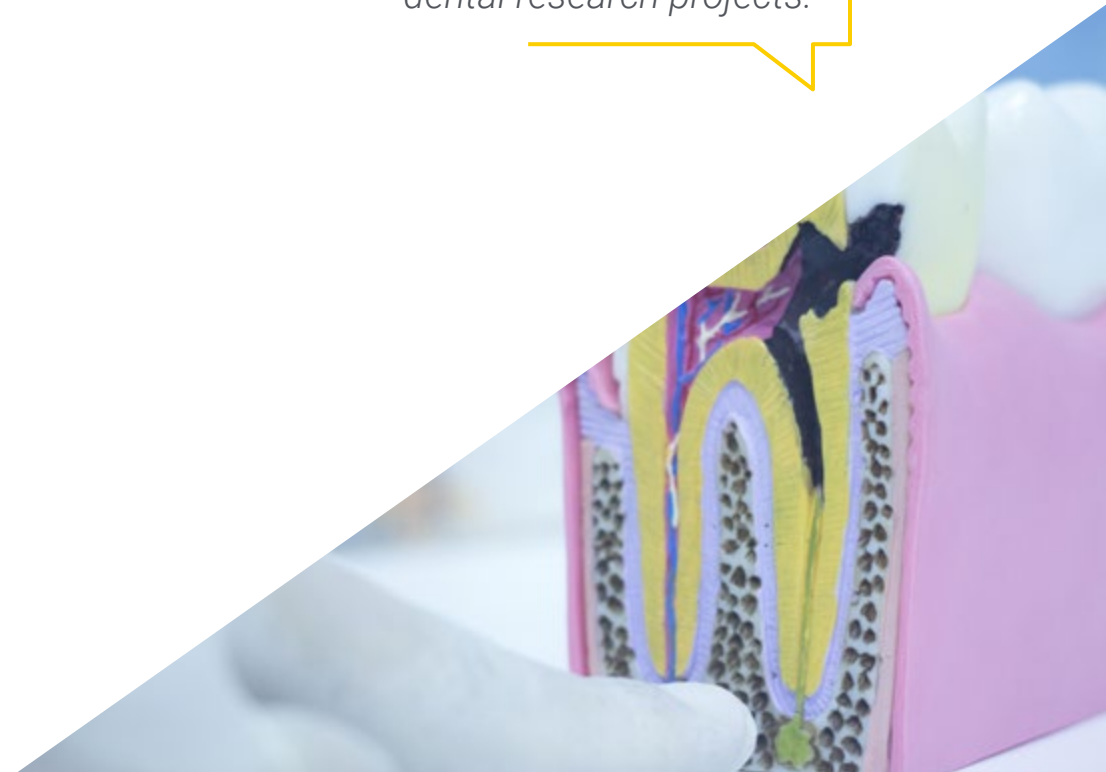
The program's teaching staff includes professionals from the sector who contribute their work experience to this educational program, as well as renowned specialists from leading societies and prestigious universities.

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 academic year. For this purpose, the student will be assisted by an innovative interactive video system created by renowned and experienced experts.

*Would you like to update your knowledge and also fulfill your professional responsibilities? This is possible with this this Postgraduate Diploma, since it adapts to your personal and professional situation.*

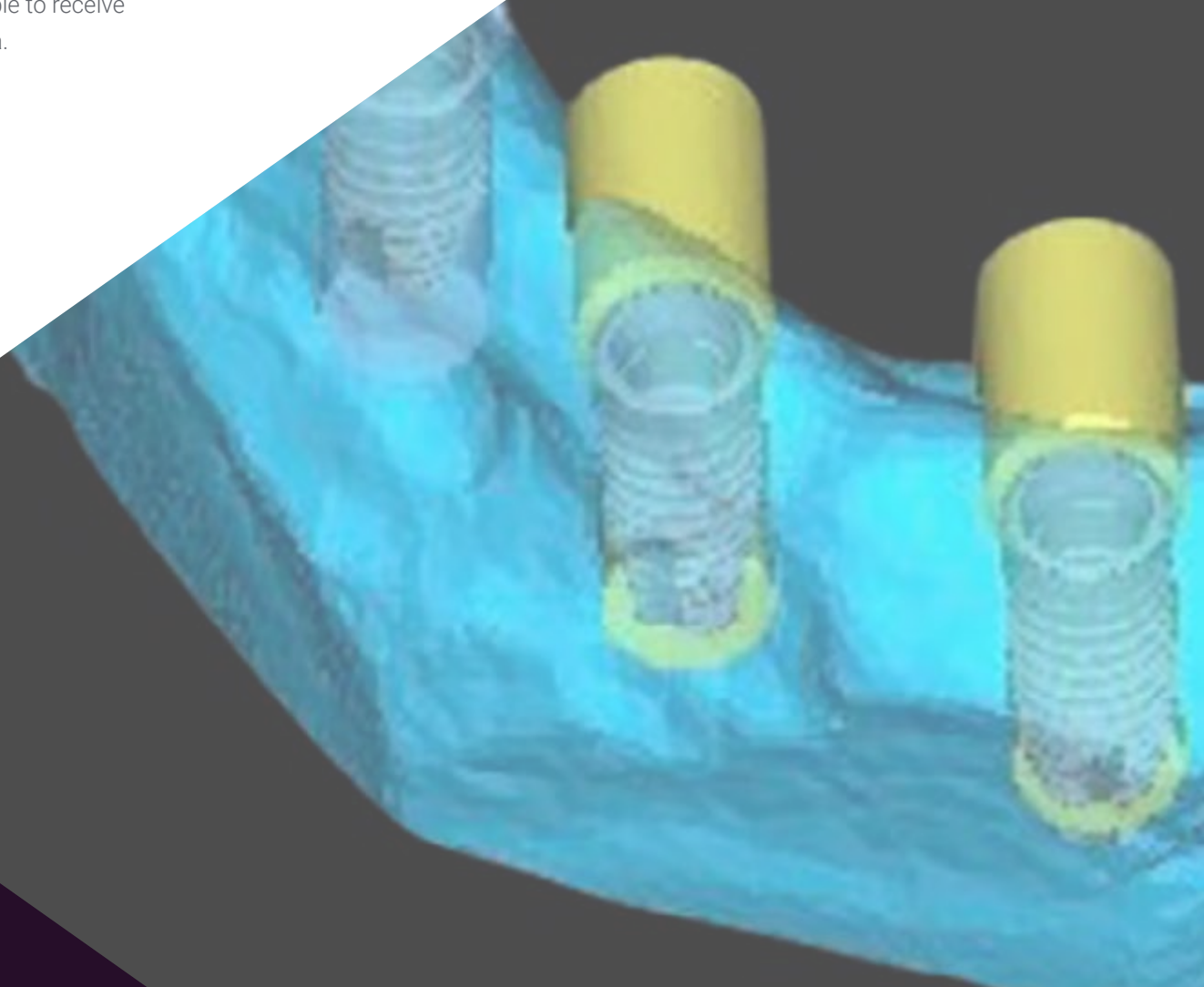
*Learn the most cutting-edge research tools to enhance your dental research projects.*



# 02

# Objectives

The way in which the program of this Postgraduate Diploma is created will allow students to master the knowledge necessary to conduct research in the field of dentistry in an organized, clear and concise manner. Thus, professionals in this specialty who wish to improve and expand their research skills will be able to receive the necessary content to position themselves as spearheads in this area.







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*Acquire the latest knowledge  
in the research field to go  
beyond standard knowledge”*



## 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



*Expand your knowledge of applied statistics and optimize your research"*





## 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
- ◆ 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

- ◆ Obtain in-depth knowledge of dimensionality reduction methods
- ◆ Delve into the comparison of methods



03

# Course Management

In order to generate cutting-edge content and thus help today's dental professionals in their professional growth, TECH has created a study structure with the help of the most prestigious professors in the field. They will be able to provide students with the tools to perform the practices, tasks and activities in the most effective way possible, with a first-hand treatment that will enable students to expand their knowledge in the use of Research Tools.



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*Master the knowledge necessary to use the main investigative tools in a more exhaustive and thorough way”*



## 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 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

### 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

### 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

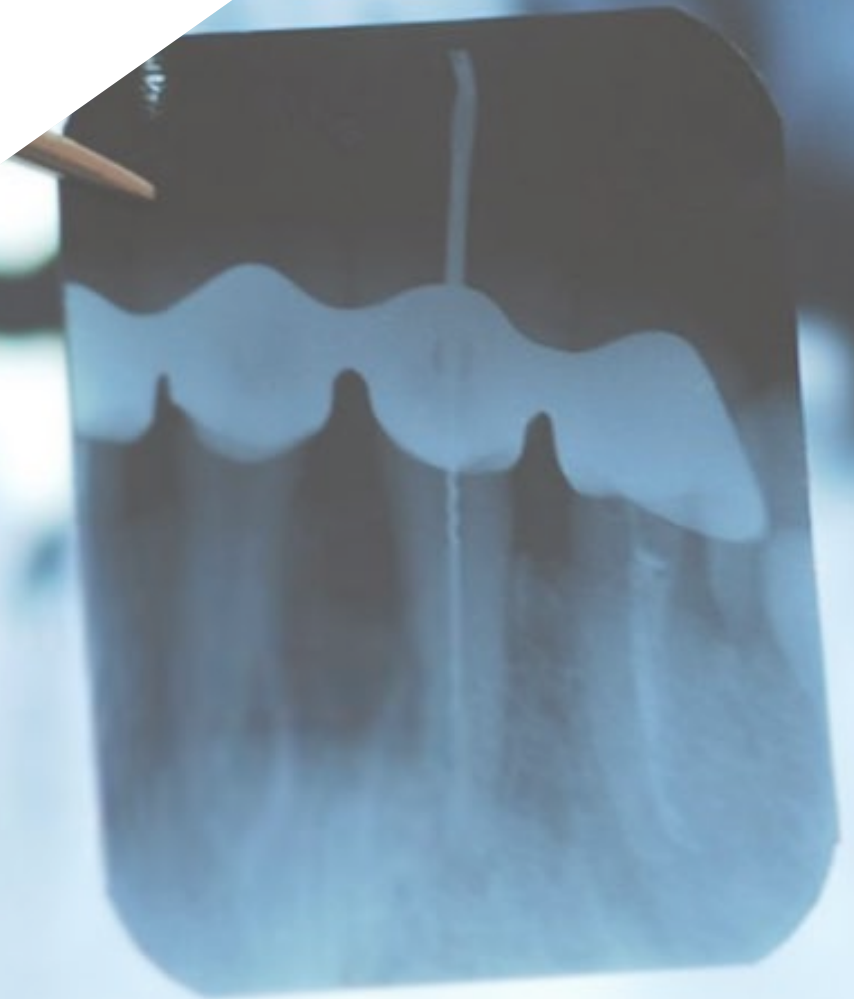


*The leading professionals in the field have come together to offer you the most comprehensive knowledge in this field, so that you can develop with total guarantees of success"*

# 04

## Structure and Content

The syllabus has been designed based on the requirements of Dentistry following the demands proposed by the teaching team of this Postgraduate Diploma, with the aim that the students acquire the latest knowledge regarding the types of tools necessary for a correct investigation. Throughout the 3 modules the professionals will study the different subjects related to the definition of hypotheses, the use of applications, statistical practices and the graphic/visual representation of the data obtained.



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*A syllabus aimed at dentists like you, who are seeking to keep up to date on the Tools for Health Research”*

## 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
  - 2.5.4. Local Fits and Generalized Additive Models (GAMs)
  - 2.5.5. 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 Stochastic Neighbor Embedding)
- 3.10. UMAP (Uniform Manifold Approximation and Projection)

# 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

In a given situation, what should a professional do? 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 dentist'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. Dentists who follow this method not only grasp concepts, but also develop their mental capacity by means of exercises to evaluate real situations and apply 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.

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 student 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 have trained more than 115,000 dentists with unprecedented success, in all 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 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.



### Educational Techniques and Procedures on Video

TECH introduces students to the latest techniques, the latest educational advances, and to the forefront of 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.

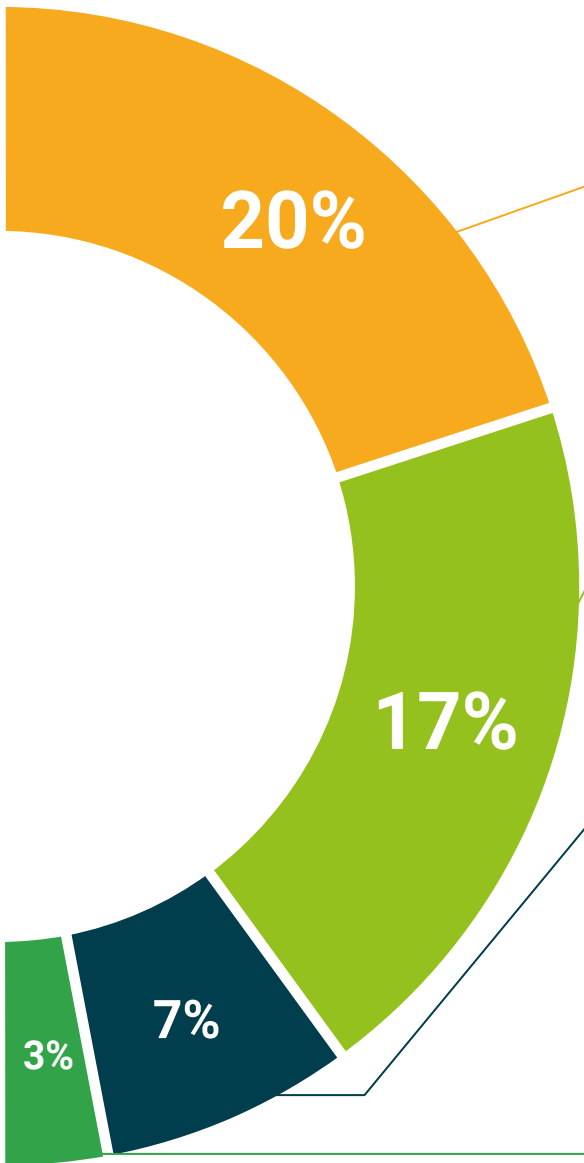
This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".



### 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 suggesting that observing third-party experts can be useful.  
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 Tools guarantees, in addition to the most rigorous and up-to-date education, access to a Postgraduate Diploma issued by TECH Technological University.





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*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 certificate 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 certificate 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 languages  
virtual classroom

**tech** technological  
university

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