

# Postgraduate Diploma

Advances in Amblyopia Biostatistics,  
Visual Quality Metrics and Measures



## Postgraduate Diploma

### Advances in Amblyopia Biostatistics, Visual Quality Metrics and Measures

Course Modality: Online

Duration: 6 months.

Certificate: TECH - Technological University

18 ECTS Credits

Teaching Hours: 450

Website: [www.techtitute.com/us/medicine/postgraduate-diploma/postgraduate-diploma-advances-amblyopia-biostatistics-visual-quality-metrics-measures](http://www.techtitute.com/us/medicine/postgraduate-diploma/postgraduate-diploma-advances-amblyopia-biostatistics-visual-quality-metrics-measures)

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# 01

# Introduction

Amblyopia is caused by the presence of amblyogenic factors (refractive errors, strabismus, deprivation or a combination of factors). Knowledge of the causes and factors in amblyopia is essential to detect them and thus prevent its development or treat it when present.

This training will present the latest advances in the knowledge of amblyopia physiopathology and its optometric management.

*A training program created to allow you to implement your acquired knowledge into your daily practice almost immediately.*





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*The latest advances in the area of optical technologies and clinical optometry compiled in a highly efficient Postgraduate Diploma that will optimize your effort with the best results”*

Amblyopias are among the main causes of decreased vision in the general population. These appear as an alteration in the development of vision at an early age, affecting not only visual acuity, but also many visual functions. The importance of detecting amblyopia lies in the fact that, if they are not treated, and the sooner the better, they will continue to affect visual function throughout life.

Continuous training in the latest optometric technologies and treatments is essential in professional updating, preparing to take on jobs that are increasingly integrated into the healthcare system, both public and private.

The Postgraduate Diploma in Latest Advances in Amblyopia covers the main fields of action for optometrists, always with the highest level of updating and with a first class teaching staff. The study plan has been designed from the perspective and experience of experts highly specialized in their modules, and immersed in the clinical world, which has led us to know the current and future training challenges.

This Postgraduate Diploma has been clearly and robustly directed to the clinical field, preparing students to develop in this field with extensive theoretical and practical knowledge in optometry.

Students will follow modules, each of them structured in 10 topics. Each topic consists of a theoretical introduction, explanations by the professor, activities, etc., in such a way that learning becomes an enjoyable journey to high-level knowledge in Optical Instrumentation and Clinical Optometry.

In conclusion, this Postgraduate Diploma provides professionals with the theoretical and clinical knowledge necessary to address any of the specialties within Optics and Optometry, as well as opening the door to clinical research.

This **Postgraduate Diploma in Advances in Amblyopia Biostatistics, Visual Quality Metrics and Measures** is the most complete and up-to-date scientific program on the market. The most important features of the program include:

- More than 100 clinical cases presented by experts in the different specialties.
- The graphic, schematic, and eminently practical contents with which they are created provide scientific and practical information on the disciplines that are essential for professional practice.
- The latest Advances in Amblyopia Biostatistics, Visual Quality Metrics and Measures.
- The presentation of hands-on workshops on procedures, diagnostic and therapeutic techniques.
- An algorithm-based interactive learning system for decision-making in the clinical situations presented throughout the course.
- 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.

“*Increase your decision-making confidence by updating your knowledge through this Postgraduate Diploma*”



“ *This Postgraduate Diploma in the latest Advances in Amblyopia will help you keep up to date in order to provide comprehensive quality care to patients”*

The teaching staff is made up of professionals belonging to the field of the latest Advances in Amblyopia Biostatistics, Metrics and Measurements of Visual Quality, who bring to this training the experience of their work, as well as recognized specialists from reference 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 an immersive training experience designed to train for real-life situations.

This program is designed around Problem Based Learning, where the medical professional must try to solve the different professional practice situations that arise during the course. For this purpose, the specialist will be assisted by an innovative interactive video system created by renowned and experienced experts in treating patients in children with extensive experience.

*All the necessary methodology for non-specialist medical professionals in the field of clinical optometry, in a specific and concrete Postgraduate Diploma.*

*We have the best didactic material, an innovative methodology and a 100% online training, which will facilitate your study.*



# 02 Objectives

This Postgraduate Diploma is designed to effectively update physician knowledge, in order to provide quality care based on the latest scientific evidence that guarantees patient safety.







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*If you are looking for success in your profession, we can help you achieve it. We offer you the most complete training on Optical Technologies and Clinical Optometry"*



## General Objectives

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- Analyze research data in the field of Vision Sciences
- Acquire the necessary knowledge to evaluate clinical cases, detect potential aberrations present, study whether they are within the normal range, and propose treatment
- Know the type of visual examination required by amblyopic patients and the most advanced techniques in their treatment, updating their educational background in order to apply it directly in their daily clinical practice

*A boost to your CV that will give you the competitiveness of the best prepared professionals in the labor market.*





## Specific Objectives

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- ♦ Know in depth the types and characteristics of amblyopia
- ♦ Know in depth the visual alterations that occur in the different types of amblyopia
- ♦ Learn the visual examination protocol to be performed for the detection and follow-up of amblyopia
- ♦ Present the results of the latest studies on amblyopia
- ♦ Know the treatment protocol to be followed on a scientific basis.
- ♦ Broaden professional projection, being able to evaluate, diagnose and treat patients with amblyopia, who are on occasion neglected by optometrists
- ♦ Define the concepts of statistics, biostatistics and epidemiology
- ♦ Understand the need to know biostatistics for clinical practice
- ♦ Understand the difference between intuitive response and response based on data analysis
- ♦ Know how to apply the appropriate graphic representation to the type of data resulting from a clinical study
- ♦ Deepen in the procedures of parametric and non-parametric analysis of data obtained through research.
- ♦ Know how to perform simple, multiple and logistic regression analysis
- ♦ In-depth knowledge of the procedures for the comparison of clinical instrumentation
- ♦ Deepen the principles of aberrometry
- ♦ Present the concept of a perfect optical system
- ♦ Understand the impossibility of an eye without aberrations
- ♦ Manage the classification of optical aberrations
- ♦ Describe the distribution of aberrations present in the normal eye
- ♦ Differentiate between the different types of optical aberrations
- ♦ In-depth knowledge of the main metrics used to evaluate visual quality
- ♦ Know the ocular optical surfaces susceptible to aberrations
- ♦ Differentiate between external and internal ocular aberrations
- ♦ Specialize in the aberrations present in corneal ocular pathology
- ♦ In-depth knowledge of the types of aberrations induced by corneal and intraocular refractive surgery
- ♦ Describe the instruments for measuring aberrations
- ♦ Present treatment strategies for ocular aberrations



03

# Course Management

The program includes in its teaching staff reference experts in the latest Advances in Amblyopia Biostatistics, Visual Quality Metrics and Measures, who bring to this training the experience of their work. Additionally, other recognized experts participate in its design and preparation, completing the program in an interdisciplinary manner.





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*Leading professionals in the field have come together to teach you the latest advances in Amblyopia Biostatistics, Visual Quality Metrics and Measures”*

## Management



### Dr. Calvache Anaya, José Antonio

- ♦ Doctor in Optometry and Vision Sciences
- ♦ Postgraduate Diploma in Statistics Applied to Health Sciences
- ♦ Optometrist at Clínica Baviera in Palma de Mallorca

## Professors

### Dr. De Lamo Requena, Mercedes

- ♦ Diploma in Optics- Optometry from the University of Valencia.
- ♦ Technical Director of IVOP "Institut Valencià d'Optimetria".





04

# Structure and Content

The content structure has been designed by a team of professionals who recognize the implications of training in medical practice for in Amblyopia Biostatistics, Visual Quality Metrics and Measurements, aware of the current relevance of specialization to be able to treat pediatric patients with urgent pathology, and committed to quality teaching through new educational technologies.





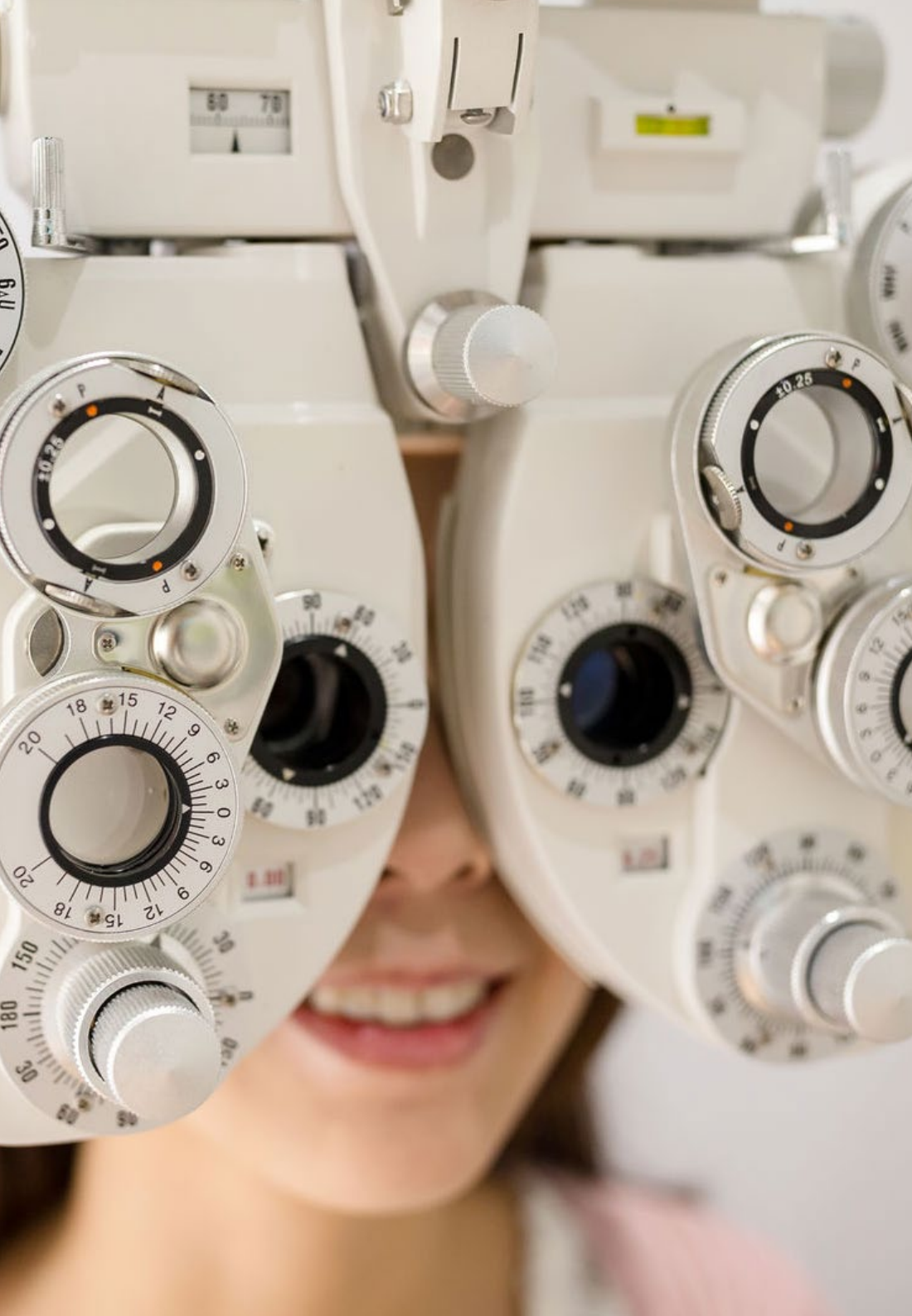
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*The latest Advances in Amblyopia Biostatistics, Visual Quality Metrics and Measures will help you keep up to date to provide comprehensive quality care to patients”*

## Module 1. Latest Advances in the Management of Amblyopia

- 1.1. General Information
  - 1.1.1. Visual Acuity Development
  - 1.1.2. Critical Period Vs Plasticity
- 1.2. Definition
- 1.3. Types of Amblyopia
  - 1.3.1. Refractive Amblyopia
  - 1.3.2. Strabismic Amblyopia
  - 1.3.3. Deprivation Amblyopia
  - 1.3.4. Combination Amblyopia
- 1.4. Visual Alterations
  - 1.4.1. Visual Acuity
  - 1.4.2. Contrast Sensitivity
  - 1.4.3. Accommodation System
  - 1.4.4. Ocular Motility
  - 1.4.5. Spatial Localization (Spatial Uncertainty and Distortions)
  - 1.4.6. Stacking Effect
  - 1.4.7. Suppression and Stereopsis
  - 1.4.8. Reading Performance
  - 1.4.9. Visuomotor Tasks
  - 1.4.10. Neurological Activity and Pupillary Reaction
  - 1.4.11. Anatomical changes
- 1.5. Visual Acuity
  - 1.5.1. Contrast Sensitivity
  - 1.5.2. Accommodation System
  - 1.5.3. Ocular Motility
  - 1.5.4. Spatial Localization (Spatial Uncertainty and Distortions)
  - 1.5.5. Stacking Effect
  - 1.5.6. Suppression and Stereopsis
  - 1.5.7. Reading Performance
  - 1.5.8. Visuomotor Tasks
  - 1.5.9. Neurological Activity and Pupillary Reaction
  - 1.5.10. Anatomical changes
- 1.6. Inclusion and Exclusion Assessment and Diagnosis
  - 1.6.1. Visual Acuity Evaluation
  - 1.6.2. Refractive Status Evaluation
  - 1.6.3. Binocular System Evaluation
  - 1.6.4. Accommodating System Evaluation
  - 1.6.5. Ocular Motility Assessment
  - 1.6.6. Ocular Health Assessment
- 1.7. Refractive Status Correction Treatment Latest Studies
  - 1.7.1. Optical Correction to Prescribe
  - 1.7.2. Time Required for Effect
  - 1.7.3. Effectiveness
- 1.8. Treatment With Occlusion and Pharmacological Penalty Latest Studies
  - 1.8.1. Occlusion
    - 1.8.1.1. Types of Occlusion
    - 1.8.1.2. Occlusion Time
    - 1.8.1.3. Effectiveness
  - 1.8.2. Pharmacological Penalty
    - 1.8.2.1. Atropine Dosage
    - 1.8.2.2. Effectiveness
    - 1.8.2.3. Comparison of Treatment With Occlusion Vs Pharmacological Penalty
    - 1.8.2.3. Treatment Compliance
    - 1.8.2.4. Treatment Regression
  - 1.8.3. Treatment With Visual Therapy Latest Studies
    - 1.8.3.1. Advantages and Inconveniences
    - 1.8.3.2. Monocular Activities
    - 1.8.3.3. Near and Far Vision Activities
    - 1.8.3.4. Antisuppressive Techniques and Binocular Therapy
  - 1.8.4. Other Current and Future Treatments
    - 1.8.4.1. Pharmacological Treatment
    - 1.8.4.2. Acupuncture
    - 1.8.4.3. Other Future Treatments





- 1.8.5. Comprehensive Management of the Amblyopia Patient
  - 1.8.5.1. Action Protocol
  - 1.8.5.2. Follow-up Evaluation
  - 1.8.5.3. Check-up Calendar

## Module 2. Biostatistics for Optics and Optometry Research

- 2.1. Concept of Biostatistics and Epidemiology
  - 2.1.1. Definition of Statistics and Biostatistics
  - 2.1.2. Clinical Research
  - 2.1.3. Evidence Levels
  - 2.1.4. Evidence-Based Optics and Optometry
- 2.2. A Visual Acuity Measurement Experiment
  - 2.2.1. The Teacher's Doubt
  - 2.2.2. Random Error and Systematic Error
  - 2.2.3. Answering a Question from Intuition or from Science
  - 2.2.4. Point or Interval Estimation
  - 2.2.5. The Confidence Interval: Concept and Utility
  - 2.2.6. The Hypothesis Contrast: Concept and Utility
- 2.3. Descriptive Statistics
  - 2.3.1. Types of Variables
  - 2.3.2. Measures of Central Tendency
  - 2.3.3. Measures of Dispersion
  - 2.3.4. Graphical Representation of the Results of a Research Project
  - 2.3.5. Use of Software
  - 2.3.6. Examples Applied to Optics and Optometry
- 2.4. Probability Distributions
  - 2.4.1. Concept of Probability
  - 2.4.2. Concept of Probability Distribution
  - 2.4.3. Binomial Distribution
  - 2.4.4. Normal Distribution
  - 2.4.5. Concept of Normality and Homoscedasticity
    - 2.4.5.1. Typified Normal Distribution
  - 2.4.6. Use of Software
  - 2.4.7. Examples Applied to Optics and Optometry

- 2.5. Confidence Intervals
  - 2.5.1. Point or Interval Estimation
  - 2.5.2. The 95% Confidence Interval
  - 2.5.3. Sample Size Estimation
  - 2.5.4. Average Estimation
  - 2.5.5. Proportion Estimation
  - 2.5.6. Confidence Interval for a Difference in Means
  - 2.5.7. Confidence Interval for a Difference in Proportions
  - 2.5.8. Use of Software
  - 2.5.9. Examples Applied to Optics and Optometry
- 2.6. Hypothesis Contrasting
  - 2.6.1. The P-Value
  - 2.6.2. Critical Analysis of P-Value
  - 2.6.3. Normality Test
    - 2.6.3.1. Kolmoronov-Smirnov
    - 2.6.3.2. Shapiro-Wilk's Test
  - 2.6.4. Homoscedasticity Test
  - 2.6.5. Use of Software
  - 2.6.6. Examples Applied to Optics and Optometry
- 2.7. Test for the Comparison of Two Samples and Two Proportions
  - 2.7.1. Parametric and Non-parametric Tests
  - 2.7.2. Student T-Test
  - 2.7.3. Welch's Test
  - 2.7.4. Wilcoxon's Test
  - 2.7.5. Mann-Whitney's Test
  - 2.7.6. Confidence Interval for the Difference of Means
  - 2.7.7. Use of Software
  - 2.7.8. Examples Applied to Optics and Optometry
- 2.8. Test for the Comparison of More than Two Samples or Proportions
  - 2.8.1. ANOVA
  - 2.8.2. Kruskal-Wallis
  - 2.8.3. Post-Hoc Analysis
  - 2.8.4. Use of Software
  - 2.8.5. Examples Applied to Optics and Optometry

- 2.9. Regression Analysis
  - 2.9.1. Simple Linear
  - 2.9.2. Multiple Linear
  - 2.9.3. Logistics
  - 2.9.4. Use of Software
  - 2.9.5. Examples Applied to Optics and Optometry
- 2.10. Comparison and Concordance Analysis Between Measurement Methods
  - 2.10.1. Difference Between Concordance and Correlation
  - 2.10.2. Bland-Altman's Graphic Method
  - 2.10.3. Use of Software
  - 2.10.4. Examples Applied to Optics and Optometry

### Module 3. Metrics and Measures of Visual Quality

- 3.1. Principles of Aberrometry
  - 3.1.1. Wavefront
    - 3.1.1.1. Perfect Wavefront
    - 3.1.1.2. Aberrated Wavefront
  - 3.1.2. Perfect Optical System and Diffraction
    - 3.1.2.1. Diffraction Rings
  - 3.1.3. Classification of Optical Aberrations
    - 3.1.3.1. High Order
    - 3.1.3.2. Low Order
  - 3.1.4. Decomposition into Zernike Polynomials
    - 3.1.4.1. Zernike Coefficients
    - 3.1.4.2. Normal Values
- 3.2. Clinically Significant Optical Aberrations
  - 3.2.1. Spherical aberration
    - 3.2.1.1. Optical Foundation
    - 3.2.1.2. Positive Spherical Aberration
    - 3.2.1.3. Negative Spherical Aberration
    - 3.2.1.4. Normal Values
  - 3.2.2. Coma.
    - 3.2.2.1. Normal Values



- 3.3. Metrics for Measuring Visual Quality
  - 3.3.1. Zernike Coefficients
  - 3.3.2. Strehl's Ratio
  - 3.3.3. CSF and MTF
  - 3.3.4. RMS
- 3.4. External Ocular Aberrations
  - 3.4.1. Corneal Geometry
  - 3.4.2. Asphericity
    - 3.4.2.1. Asphericity Coefficients
    - 3.4.2.2. Aspherical and Spherical Aberration
  - 3.4.3. Normal Distribution of Corneal Aberrations
    - 3.4.3.1. Normal Eye Asphericity
    - 3.4.3.2. Normal Eye Coma
- 3.5. Internal Ocular Aberrations
  - 3.5.1. Lens.
  - 3.5.2. Methods
- 3.6. Aberrations in Irregular Corneas
  - 3.6.1. Keratoconus
  - 3.6.2. Corneal Ectasia
- 3.7. Induced Aberrometric Changes on the Cornea
  - 3.7.1. Orthokeratology
    - 3.7.1.1. Focused Treatment Case
    - 3.7.1.2. Off-Center Treatment Case
  - 3.7.2. Aberrometric Changes Induced by Corneal Refractive Surgery
    - 3.7.2.1. Myopia Surgery
    - 3.7.2.2. Hyperopia Surgery
    - 3.7.2.3. Off-Center Ablations
- 3.8. Aberrometric Changes Induced by Crystalline Lens Surgery and Intraocular Lens Implants
  - 3.8.1. Intraocular Lens Aberrations
  - 3.8.2. Asphericity and Aberrations in the Pseudophakic Eye
- 3.9. Instruments for Measuring Visual Quality
  - 3.9.1. Surveyors
  - 3.9.2. Hartman-Shack Aberrometry
- 3.10. Compensating Ocular Aberrations
  - 3.10.1. Contact Lenses
  - 3.10.2. Corneal Topography Guided Laser Ablation



*A unique, key, and decisive training experience to boost your professional development"*

05

# Methodology

This training program provides you with a different way of learning. Our methodology uses a cyclical learning approach: ***Re-learning***.

This teaching system is used 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 Re-learning, 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 would you do? Throughout the program, you will be presented with multiple simulated clinical cases based on real patients, where you will have to investigate, establish hypotheses and, finally, 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 can 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 potential 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 professional medical 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. Students 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 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.



## Re-learning Methodology

At TECH we enhance the Harvard case method with the best 100% online teaching methodology available: Re-learning.

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.



*The physician 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 Re-learning method has managed to improve the overall satisfaction levels of professionals who complete their studies, with respect to the quality indicators of the best Spanish-speaking online university (Columbia University).

With this methodology we have trained more than 250,000 physicians with unprecedented success, in all clinical specialties regardless of the surgical load. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

*Re-learning 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 (we 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.



In this program you will have access to the best educational material, prepared with you 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.

This content is then adapted in an audiovisual format that will create our way of working online, with the latest techniques that allow us to offer you high quality in all of the material that we provide you with.



#### Latest Techniques and Procedures on Video

We introduce you to the latest techniques, to the latest educational advances, to the forefront of current medical techniques. All this, in first person, with the maximum rigor, explained and detailed for your assimilation and understanding. And best of all, you can watch them as many times as you want.



#### Interactive Summaries

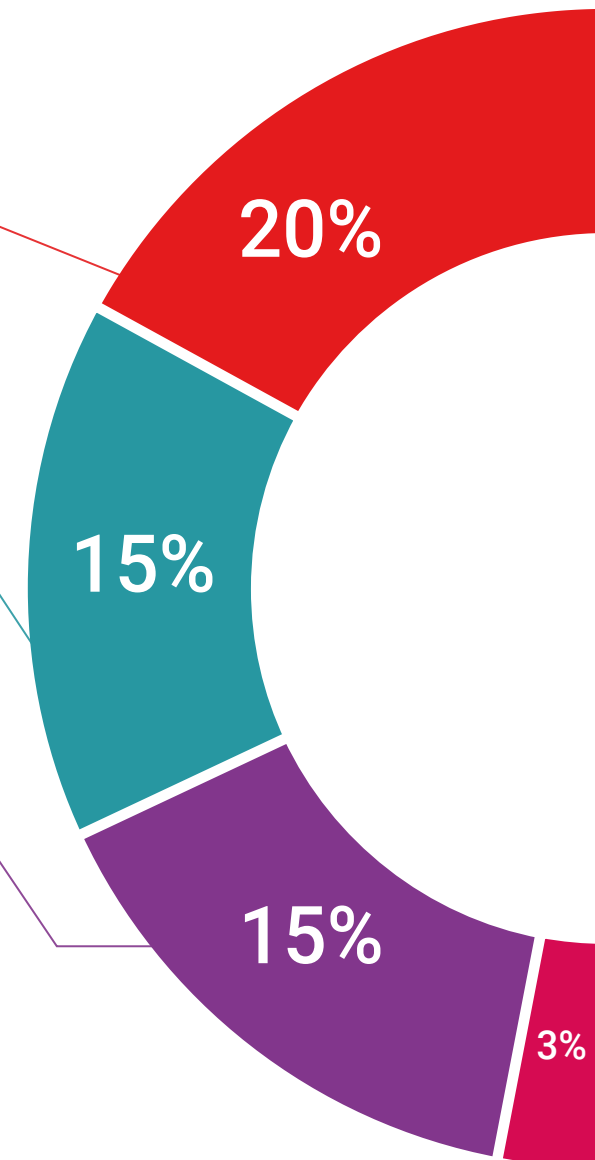
We present the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

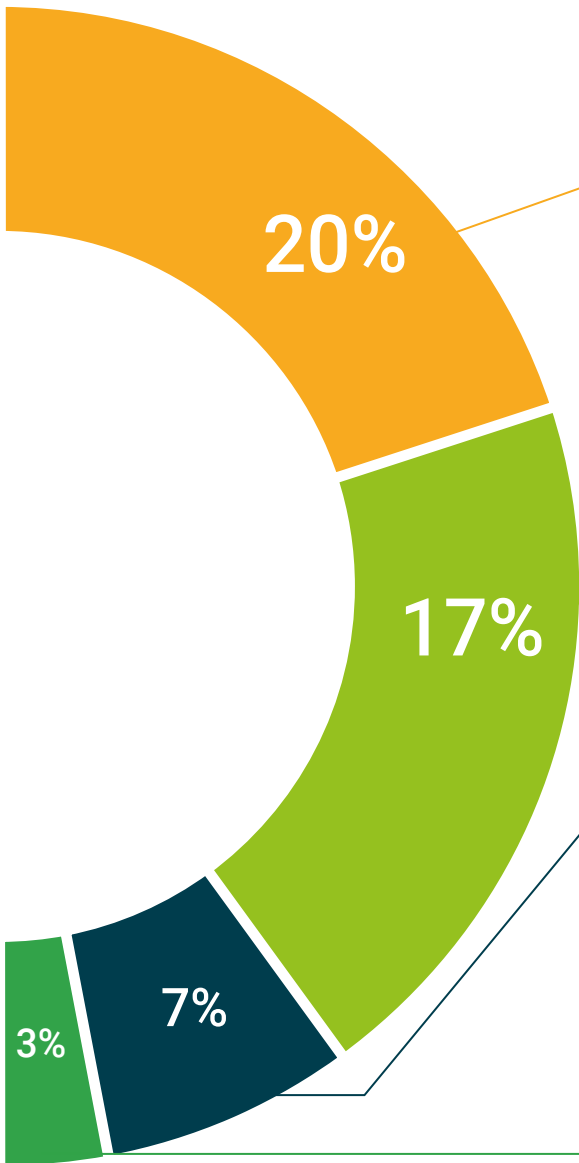
This unique multimedia content presentation training system was awarded by Microsoft as a "European Success Story".



#### Additional Reading

Recent articles, consensus documents, international guides. in our virtual library you will have access to everything you need to complete your training.





**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 your knowledge throughout the program, through assessment and self-assessment activities and exercises: so that you can see how you are achieving your 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 our difficult future decisions.



**Quick Action Guides**

We offer you the most relevant contents of the course in the form of worksheets or quick action guides. A synthetic, practical, and effective way to help you progress in your learning.





# 06

# Certificate

Through a different and stimulating learning experience, you will be able to acquire the necessary skills to take a big step in your training. An opportunity to progress, with the support and monitoring of a modern and specialized university, which will propel you to another professional level.





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*Include in your qualifications a Postgraduate Diploma in Advances in Amblyopia Biostatistics, Visual Quality Metrics and Measures: A highly qualified added value for any medical professional”*

This **Postgraduate Diploma in Amblyopia Biostatistics, Visual Quality Metrics and Measures** is the most complete and up-to-date scientific program on the market.

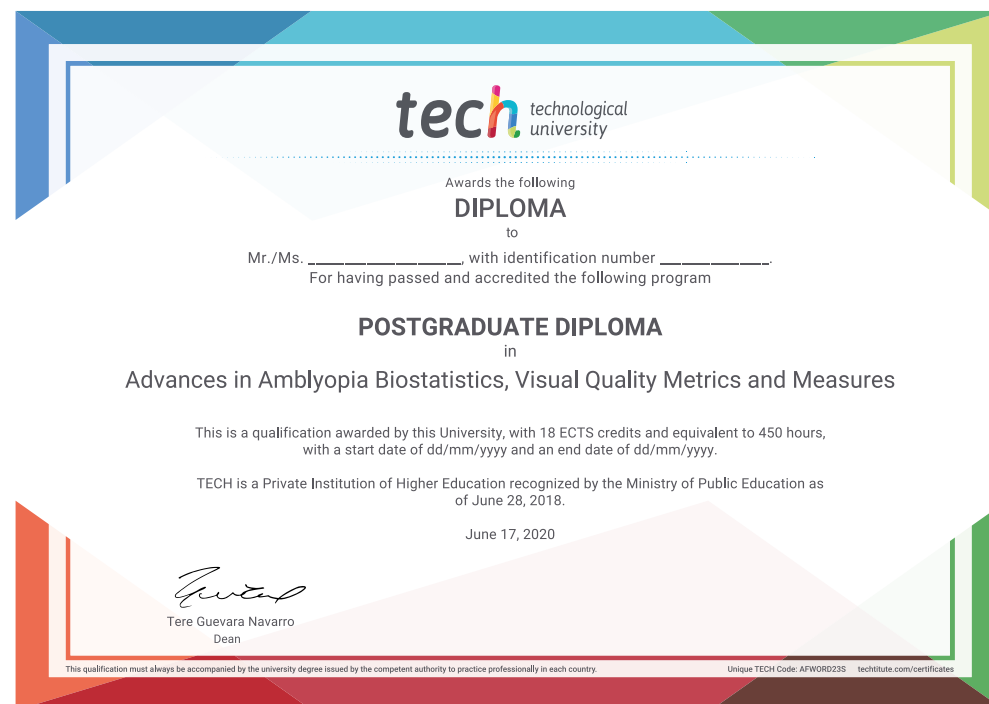
After the student has passed the evaluations, they will receive their corresponding certificate issued by **TECH - Technological University by tracked mail**.

This qualification contributes significantly to the professional's continuing education and enhances their training with a highly regarded university syllabus, and is 100% valid for all public examinations, professional careers and job vacancies.

Title: **Postgraduate Diploma in Advances in Amblyopia Biostatistics, Visual Quality Metrics and Measures**

ECTS: **18**

Official Number of Hours: **450**



\*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  
development languages  
virtual classroom

**tech** technological  
university

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