

# Postgraduate Certificate Light and Optics



## Postgraduate Certificate Light and Optics

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

Website: [www.techtute.com/us/medicine/postgraduate-certificate/light-optics](http://www.techtute.com/us/medicine/postgraduate-certificate/light-optics)

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Certificate

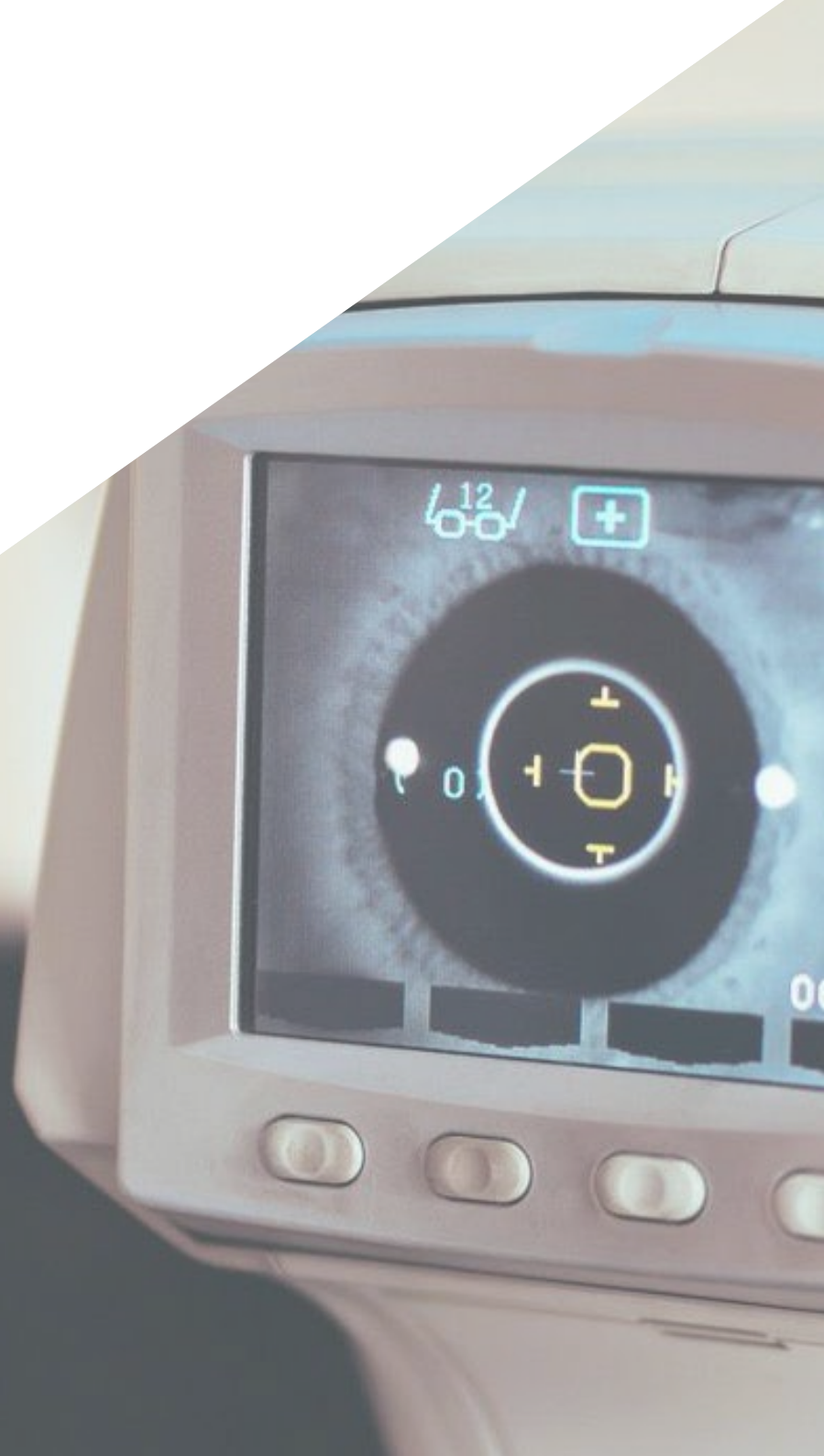
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# 01

# Introduction

The use of screens, the limited visual rest to which the eyes are subjected due to long exposures to digital devices makes it increasingly common to find people with vision problems. This 100% online program provides intensive learning about light, the main tool with which the visual system perceives the outside world. From this basis, the concepts that determine the quality of a lens or lenses systems are developed. Through a theoretical-practical approach, the optometrist professional and health personnel will be immersed in this field, which requires an exhaustive knowledge base.





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*A university program with multimedia content  
that is at the forefront of academic teaching”*

This Postgraduate Certificate in Light and Optics provides students with an up-to-date and basic understanding of the key concepts that comprise the visual system, the nature and mode of propagation of light. The specialized teaching team with extensive experience in the sector will be in charge of providing the most up-to-date and modern content in this field.

A fully online program that will provide a solid understanding of how light interacts with the environment and how optical surfaces work. An opportunity for health professionals who wish to renew their knowledge about lenses, their properties and applications.

Likewise, the simulations of practical cases will facilitate the updating of the concept of aberrometry, where the procedures will also be delved into as an introduction to the study of ocular aberrations. A program that allows to learn about the latest scientific advances in geometric, physical, physiological and instrumental optics. All this with multimedia content consisting of video summaries, specialized readings and simulations of real cases with which to keep up to date with the latest knowledge on light and optics.

TECH therefore offers an excellent opportunity for healthcare personnel who wish to keep up-to-date with recent research in this field to do so while combining their work responsibilities with a high-level university program. This educational institution provides a quality education that can be accessed comfortably at any time of the day with just an electronic device with an Internet connection. This way, students will be able to access or download the cutting-edge multimedia content that is part of this syllabus whenever they wish. In addition, this allows you to distribute the course load according to your needs in a more practical and agile way.

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

- ◆ The development of practical cases presented by experts in Ophthalmic Optics
- ◆ 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 self-assessment can be used to improve learningIts 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



*It delves into the different types of existing aberrations and their approach from the Optical point of view"*

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*A university course which you can access 24 hours a day from your computer or Tablet”*

*Get up to date on recent advances in the optical quality of the visual system with this 100% online program.*

*A program that allows you to renew your knowledge about diopter and spherical meniscus.*

The program's teaching team 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 professionals 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.



# 02 Objectives

This Postgraduate Certificate provides the health professional with a renewed knowledge of optics with special emphasis on light and its relationship with the different lenses used for the correction of visual problems. It will also provide you with an academic experience that will lead you to learn about the latest developments in optical aberrations. The specialized teaching staff that imparts this program will contribute all their knowledge in this field so that the students will be able to obtain the most up-to-date knowledge in this area.





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*It delves into geometrical, physical and instrumental optics under the guidance of an expert teaching staff in this field"*



## General Objectives

- ◆ Provide the student with the basis of geometrical, physical, physiological and instrumental optics, fundamental to understand the rest of the program
- ◆ Describe the eye as an optical system
- ◆ Introduce the main concepts of aberrometry of optical systems



*Renew your knowledge in the focal concepts and power of a lens or optical system with this Postgraduate Certificate"*





## Specific Objectives

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- ◆ Know the nature of light
- ◆ Learn to apply Snell's Law
- ◆ Learn the concepts of focal and power of a lens or optical system
- ◆ Describe the fundamentals of some optical instruments, specifically the telescope and the microscope
- ◆ Describe the eye as an optical system
- ◆ Introduce the main concepts of aberrometry of optical systems

# 03

## Course Management

The management and teaching of this Postgraduate Certificate is in charge of an optometrist with extensive experience in the health sector, who is currently active in one of the reference clinics in this field. Its extensive knowledge in the field of vision will be of great use for Optical and Optometry personnel who wish to carry out a reminder of basic concepts of optics, resident doctors in Ophthalmology and other health professionals who wish to obtain knowledge of ocular optics. The quality and proximity of the teaching staff will be key during the development of this university program and for the achievement of the students' objectives.





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*A specialized teacher will provide you with recent studies in the field of spherical aberrations and their correction”*

## Management



### **Dr. Calvache Anaya, José Antonio**

- Optometrist at Clínica Baviera in Palma de Mallorca
- Professor in courses on Biostatistics, Keratometry and Corneal Topography and Ocular Biometry
- Degree in Optics and Optometry from the University of Alicante
- PhD in Optometry and Vision Sciences by the University of Valencia
- Master's Degree Advanced Optometry and Vision Sciences, University of Valencia
- Postgraduate Diploma in Statistics Applied to Health Sciences UNED
- Postgraduate Certificate in Optics and Optometry from the University of Alicante



# 04

## Structure and Content

The syllabus has been designed by the teaching staff of this program taking into account the most recent developments in light and the lenses used to address the different visual problems that are present today in the people. Therefore, during the 150 academic hours of this Postgraduate Certificate, the health professional will achieve a renewed knowledge of concepts such as the way light is captured by the eye and optical systems. They will also conclude this 100% online program with a more recent knowledge related to optical aberrations. The Relearning system,, which TECH employs in all its programs, will help to achieve a more natural and agile progress in this educational program, reducing the long hours of study.





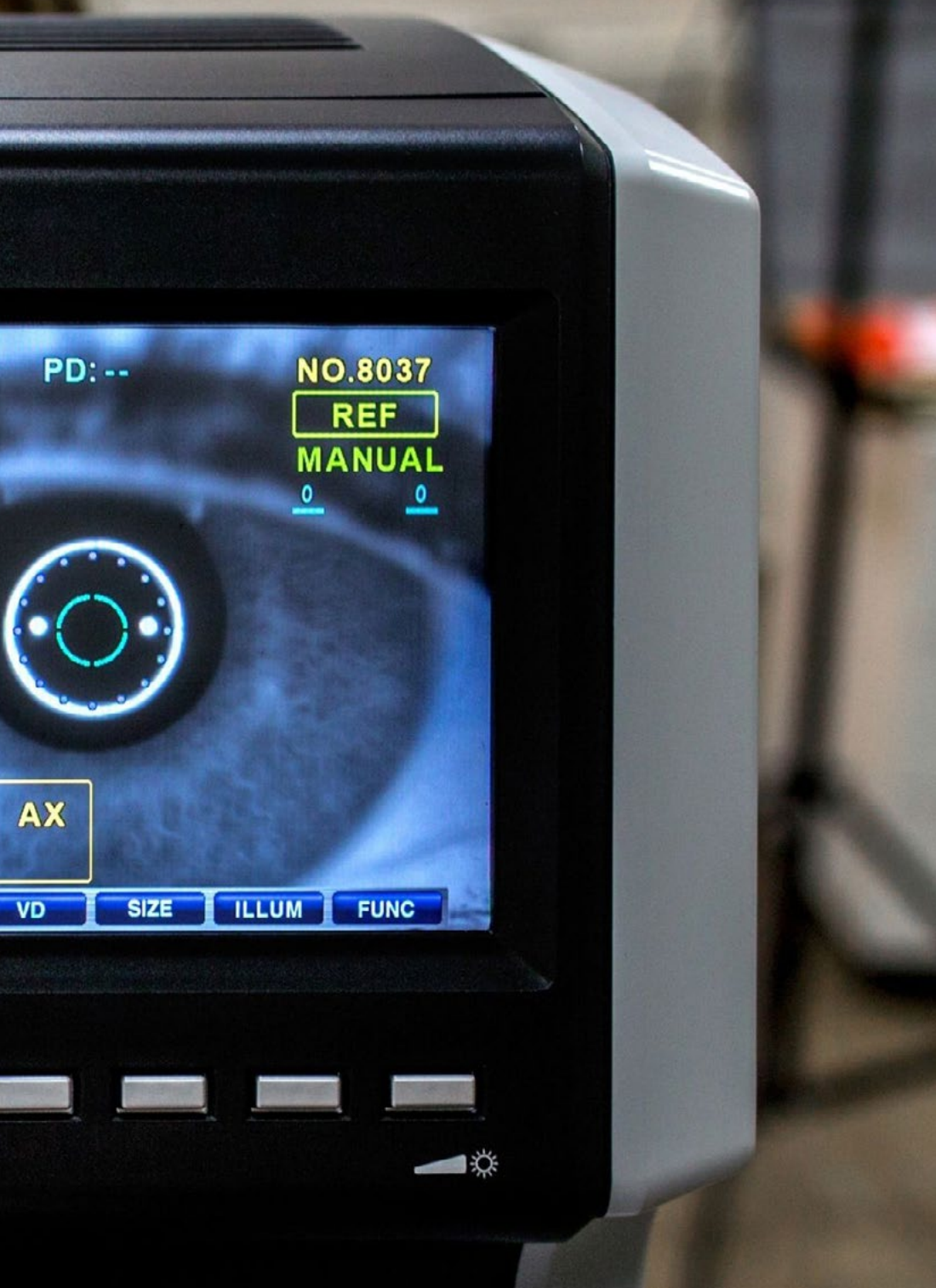
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*The simulation of real cases will allow you to put into daily clinical practice the up-to-date knowledge shown in this Postgraduate Certificate”*

## Module 1. Light and Optics

- 1.1. Nature of Light
  - 1.1.1. Waves and Corpuscles
  - 1.1.2. The Wave Front
    - 1.1.2.1. Waves and Rays
  - 1.1.3. Principles of Photometry
  - 1.1.4. Luminous Flux
  - 1.1.5. Luminous Intensity
  - 1.1.6. Luminance
- 1.2. Paraxial Optics
  - 1.2.1. Paraxial Environment
  - 1.2.2. Definitions
  - 1.2.3. Refraction and Reflection
  - 1.2.4. Snell's Law
- 1.3. Meniscus, Lenses and Ray Tracing
  - 1.3.1. Diopter Definition
  - 1.3.2. Spherical Meniscus
    - 1.3.2.1. Focal and Power of a Spherical Meniscus
  - 1.3.3. Thin Lenses
    - 1.3.3.1. Focal and Power of a Lens
    - 1.3.3.2. Spherical Lenses
    - 1.3.3.3. Aspherical Lenses
    - 1.3.3.4. Toric or Astigmatic Lenses
    - 1.3.3.5. Spherotoric Lenses
  - 1.3.4. Ray Tracing
  - 1.3.5. Diaphragms
- 1.4. Optical Systems
  - 1.4.1. Thick Lens
    - 1.4.1.1. Optical Coupling of the Two Surfaces
    - 1.4.1.2. Main and Nodal Planes
    - 1.4.1.3. Focal and Power of the Lens
  - 1.4.2. Two-Lens System
    - 1.4.2.1. Optical Coupling of the Two Lenses
    - 1.4.2.2. Main and Nodal Planes
    - 1.4.2.3. Focal and System Power





- 1.5. Optical Instruments
  - 1.5.1. Telescope
    - 1.5.1.1. Newton
    - 1.5.1.2. Galileo
    - 1.5.1.3. Increases
  - 1.5.2. Microscope
    - 1.5.2.1. Increases
  - 1.5.3. The Eye as an "Optical Instrument"
- 1.6. Optical Aberrations I
  - 1.6.1. The Perfect Wavefront vs. The Real Wavefront
  - 1.6.2. Analysis of the Quality of an Optical System
    - 1.6.2.1. Diffraction
    - 1.6.2.2. Diffraction Limitation to the Perfect System
    - 1.6.2.3. Modulation Transfer Function (MTF)
    - 1.6.2.4. Point Spread Function (PSF)
    - 1.6.2.5. Strehl Ratio
- 1.7. Optical Aberrations II
  - 1.7.1. Spherical aberration
    - 1.7.1.1. Spherical Aberration Asphericity
  - 1.7.2. Coma.
  - 1.7.3. Zernike Polynomials
    - 1.7.3.1. Low and High Order Aberrations
    - 1.7.3.2. RMS
  - 1.7.4. Seidel Aberrations
  - 1.7.5. Clinical Aberrations



*Learn about the latest scientific studies that address optical aberrations with this Postgraduate Certificate"*

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. Specialists learn better, faster, and more sustainably over time.

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



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

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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 achieve the assimilation of concepts, but also a development of their mental capacity, through exercises that evaluate real situations and the application of knowledge.
2. Learning is solidly translated into practical skills that allow the student to better integrate into the real world.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life.
4. Students like to feel that the effort they put into their studies is worthwhile. This then translates into a greater interest in learning and more time dedicated to working on the course.



## Relearning Methodology

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

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

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





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

With this methodology, more than 250,000 physicians have been trained with unprecedented success in all clinical specialties regardless of surgical load. Our pedagogical methodology is developed in a highly competitive environment, with a university student body with a strong socioeconomic profile and an average age of 43.5 years old.

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

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

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



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



#### Study Material

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

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



#### Surgical Techniques and Procedures on Video

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



#### Interactive Summaries

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

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



#### Additional Reading

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





#### Expert-Led Case Studies and Case Analysis

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



#### Testing & Retesting

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



#### Classes

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



#### Quick Action Guides

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



# 06 Certificate

The Postgraduate Certificate in Light and Optics 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 program and receive your university qualification without having to travel or fill out laborious paperwork”*

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

Title: **Postgraduate Certificate in Light and Optics**

Official N° of Hours: **150 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  
development language  
virtual classroom



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