

Postgraduate Certificate Optics



Postgraduate Certificate Optics

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

Website: www.techtitute.com/us/engineering/postgraduate-certificate/optics

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01

Introduction

Understanding light, how it works and its properties has meant a great development for human beings in areas such as astronomy, photography and medicine. Thanks to the knowledge in optics, the James Webb telescope has been designed and created, and fiber optics has been implemented, improving communications. Progress, where the engineering professional brings, from his multidisciplinary vision, technical knowledge that requires, however, a mastery of physics. That is why TECH Technological University has developed this 100% online program that facilitates the most advanced and comprehensive learning about the physical principles on which the most common optical instruments are based. To this end, the graduate will be provided with multimedia pills and case studies, elaborated by a specialized teaching team, which will lead him/her to boost his/her professional career.



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A 100% Diploma in Optics whose learning will open up a world of possibilities in the field of Engineering”

Behind the manufacture of medical devices, lenses or lasers lies a thorough and precise understanding of the concept of light. Optics has thus become a fundamental tool for the development of disciplines such as engineering, which has made use of the knowledge of this field of physics to create solar panels, fuse energy, design more economical LED lights or use lasers in the manufacturing industry.

However, the applications of Optical Physics are multiple and very present in everyday life, such as in movie theaters, televisions or credit card payments. The principles and laws of light offer a range of creative possibilities that any engineering professional can apply if they have the necessary knowledge. For this reason, both private and public companies demand highly qualified profiles with the ability to design and solve problems where physics is involved.

Faced with this reality, TECH Technological University has developed this Diploma in Optics, where students will be immersed over 6 weeks, in an intensive and advanced learning about waves, the electromagnetic theory of light or the formation of images. In addition, multimedia resources will introduce you to the main optical instruments such as the human eye, telescopes, cameras and microscopes in a much more enjoyable and dynamic way.

In addition, thanks to the Relearning method, students will be able to reduce the long hours of study and advance naturally and progressively through the syllabus of this program taught exclusively online.

Engineering professionals have an excellent opportunity to boost their careers through a Diploma that they can access whenever and wherever they wish. They only need an electronic device with an internet connection to be able to access, at any time, the syllabus hosted on the virtual platform. An Academic ideal option for those who want to balance the most demanding responsibilities with a quality education.

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

- ◆ Practical case studies are presented by experts in Physics
- ◆ 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 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



*Enroll now in a university degree,
whose Relearning method will
allow you to save hours of study”*

“

With this program you will obtain the necessary basis in Optical Physics to apply it in the creation of devices for the healthcare field”

Access Young's Ranges or the Fabry-Perot and Michelson interferometers comfortably from your tablet with internet connection.

Enroll now in an academic option that will introduce you to geometric optics and its application in the creation of telescopes.

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

Its multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide an immersive education programmed to learn in real situations.

The design of this program focuses on Problem-Based Learning, by means of which the professional must try to solve the different professional practice situations that are presented throughout the academic course. This will be done with the help of an innovative system of interactive videos made by renowned experts.



02

Objectives

Upon completion of this course, students will have acquired the necessary knowledge to master the main concepts of Optical Physics. For this purpose, TECH Technological University provides the most current and innovative pedagogical tools, which will lead you to understand the general principles and to apply effective solutions to any problem related to geometrical optics. The High School team that teaches on the program will support in the course of this to successfully achieve these goals.



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Case study multimedia pills and be very useful in achieving your objectives”



General Objectives

- ♦ Understand the relationship between optics and other physics disciplines
- ♦ Understand the General Principles and Interference Conditions
- ♦ Learn in-depth the basic knowledge of geometrical optics





Specific Objectives

- ◆ Know the physical principles on which the most common optical instruments are based
- ◆ Understand and analyze optical phenomena present in daily life
- ◆ Apply the concepts of optics to physical problem solving related to optics

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With this Diploma you will be able to take a step forward in your engineering career and in the construction of equipment based on the principles of Optical Physics”

03

Structure and Content

In its maxim to offer students a quality education, TECH Technological University uses the latest technology applied to the academic field in the development of its programs. Thus, by means of video summaries, detailed videos, diagrams or complementary readings, the graduate will learn about waves, the electromagnetic theory of light, anisotropic media or diffraction. Such content will be available 24 hours a day and will be accessible through any electronic device with an Internet connection.

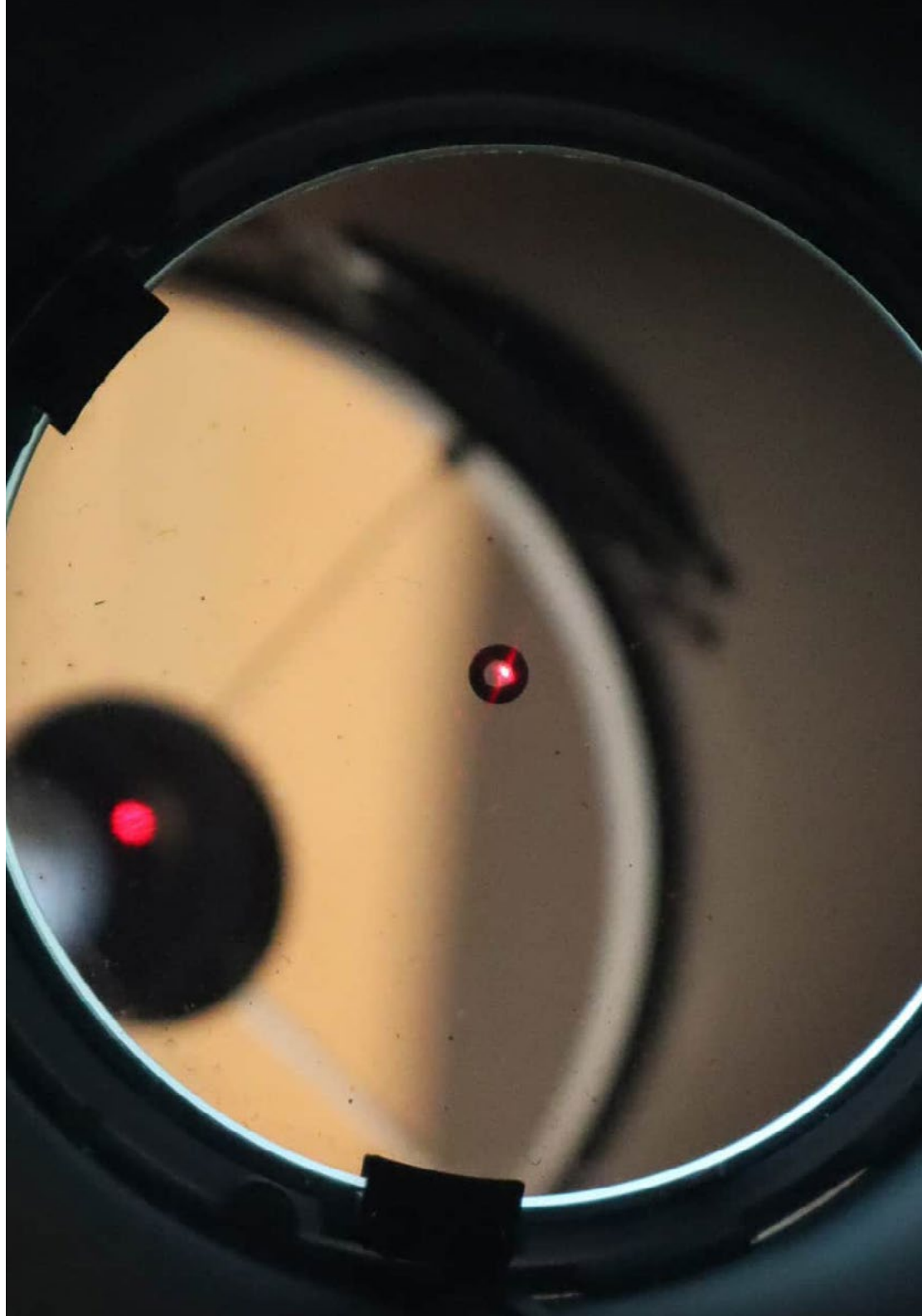


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A study plan that will take you for 6 weeks to delve into waves, the electromagnetic theory of light or optical instruments”

Module 1. Optics

- 1.1. Waves: Introduction
 - 1.1.1. Wave Motion Equation
 - 1.1.2. Plane Waves
 - 1.1.3. Spherical Waves
 - 1.1.4. Harmonic Solution of the Wave Equation
 - 1.1.5. Fourier Analysis
- 1.2. Wavelet Superposition
 - 1.2.1. Superposition of Waves of the Same Frequency
 - 1.2.2. Superposition of Waves of Different Frequency
 - 1.2.3. Phase Velocity and Group Velocity
 - 1.2.4. Superposition of Waves with Perpendicular Electric Vectors
- 1.3. Electromagnetic Theory of Light
 - 1.3.1. Maxwell's Macroscopic Equations
 - 1.3.2. The Material Response
 - 1.3.3. Energy Relations
 - 1.3.4. Electromagnetic Waves
 - 1.3.5. Homogeneous and Isotropic Linear Medium
 - 1.3.6. Transversality of Plane Waves
 - 1.3.7. Energy Transport
- 1.4. Isotropic Media
 - 1.4.1. Reflection and Refraction in Dielectrics
 - 1.4.2. Fresnel Formulas
 - 1.4.3. Dielectric Media
 - 1.4.4. Induced Polarization
 - 1.4.5. Classical Lorentz Dipole Model
 - 1.4.6. Propagation and Diffusion of a Light Beam
- 1.5. Geometric Optics
 - 1.5.1. Paraxial Approximation
 - 1.5.2. Fermat's Principle
 - 1.5.3. Trajectory Equation
 - 1.5.4. Propagation in Non-Uniform Media



- 1.6. Image Formation
 - 1.6.1. Image Formation in Geometrical Optics
 - 1.6.2. Paraxial Optics
 - 1.6.3. Abbe's Invariant
 - 1.6.4. Increases
 - 1.6.5. Centered Systems
 - 1.6.6. Focuses and Focal Planes
 - 1.6.7. Planes and Main Points
 - 1.6.8. Thin Lenses
 - 1.6.9. System Coupling
- 1.7. Optical Instruments
 - 1.7.1. The Human Eye
 - 1.7.2. Photographic and Projection Instruments
 - 1.7.3. Telescopes
 - 1.7.4. Near Vision Instruments: Compound Magnifier and Microscope
- 1.8. Anisotropic Media
 - 1.8.1. Polarization
 - 1.8.2. Electrical Susceptibility Index Ellipsoid
 - 1.8.3. Wave Equation in Anisotropic Media
 - 1.8.4. Propagation Conditions
 - 1.8.5. Refraction in Anisotropic Media
 - 1.8.6. Fresnel Construction
 - 1.8.7. Construction with the Index Ellipsoid
 - 1.8.8. Retarders
 - 1.8.9. Absorbent Anisotropic Media
- 1.9. Interference
 - 1.9.1. General Principles and Interference Conditions
 - 1.9.2. Wavefront Split Interference
 - 1.9.3. Young's Stripes
 - 1.9.4. Amplitude Division Interferences
 - 1.9.5. Michelson's Interferometer
 - 1.9.6. Interference of Multiple Beams Obtained by Amplitude Division
 - 1.9.7. Fabry-Perot's Interferometer
- 1.10. Diffraction
 - 1.10.1. The Huygens-Fresnel Principle
 - 1.10.2. Fresnel and Fraunhofer Diffraction
 - 1.10.3. Fraunhofer's Diffraction through an Aperture
 - 1.10.4. Limitation of the Resolutive Power of the Instruments
 - 1.10.5. Fraunhofer Diffraction by Various Apertures
 - 1.10.6. Double Slit
 - 1.10.7. Diffraction Grating
 - 1.10.8. Introduction to Kirchhoff's Scalar Theory



This 100% online course will enable you to master Fresnel and Fraunhofer diffraction"

04

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"

Case Study to contextualize all content

Our program offers a revolutionary approach to developing skills and knowledge. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

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At TECH, you will experience a learning methodology that is shaking the foundations of traditional universities around the world”



You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.



The student will learn to solve complex situations in real business environments through collaborative activities and real cases.

A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.

“*Our program prepares you to face new challenges in uncertain environments and achieve success in your career”*

The case method is the most widely used learning system in the best faculties in the world. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question that you are presented with in the case method, an action-oriented learning method. Throughout the program, the studies will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their ideas and decisions.

Relearning Methodology

TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

We enhance the Case Study with the best 100% online teaching method: Relearning.

In 2019, we obtained the best learning results of all online universities in the world.

At TECH, you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Relearning.

Our university is the only one in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.



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.

This methodology has trained more than 650,000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, and financial markets and instruments. All this in a highly demanding environment, where the students have a strong socio-economic 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 training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.



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.



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.



Practising Skills and Abilities

They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.



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.





Case Studies

Students will complete a selection of the best case studies chosen specifically for this program. Cases that are presented, analyzed, and supervised by the best specialists in the world.



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".



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.



05

Certificate

The Postgraduate Certificate in 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 Optics** contains the most complete and up-to-date 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 Postgraduate Certificate, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Postgraduate Certificate in 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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- » Dedication: 16h/week
- » Schedule: at your own pace
- » Exams: Online

Postgraduate Certificate Optics

