

# Postgraduate Certificate Radiophysics in External Radiotherapy in Proton Therapy





## Postgraduate Certificate Radiophysics in External Radiotherapy in Proton Therapy

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

Website: [www.techtute.com/us/engineering/postgraduate-certificate/radiophysics-external-radiotherapy-proton-therapy](http://www.techtute.com/us/engineering/postgraduate-certificate/radiophysics-external-radiotherapy-proton-therapy)

# Index

01

Introduction

---

*p. 4*

02

Objectives

---

*p. 8*

03

Course Management

---

*p. 12*

04

Structure and Content

---

*p. 16*

05

Methodology

---

*p. 20*

06

Certificate

---

*p. 28*

# 01

# Introduction

In the current context of Medical Engineering, Protontherapy has emerged as a cutting-edge technology in the treatment of Cancer. Therefore, the demand for engineers with specialization in this area is increasing, as this innovative technique offers an advanced and precise alternative in External Radiotherapy. This approach is crucial in the management and application of state-of-the-art medical technologies. Professionals, by specializing in Protontherapy, not only broaden their skills and career prospects, but also become key players in the advancement of oncology care. This online course is tailored to the needs of practicing engineers, offering flexibility and multimedia resources for effective specialized training.



“

*Thanks to this unique TECH program,  
you will delve into the clinical use of  
proton beams and their application in  
Medical Engineering”*

Today, Proton Therapy has revolutionized the landscape of External Radiotherapy, offering a highly precise and effective approach in the treatment of Cancer. The need for specialized engineers in this field has grown exponentially, as this novel technique requires close collaboration between healthcare professionals, engineers and scientists. The interdisciplinary complexity of this treatment highlights the importance of comprehensive training, linking technical knowledge with a thorough understanding of clinical demands.

In this context, this university program is presented as a precise response, providing engineers with the essential tools to excel in a multidisciplinary work environment. In terms of syllabus, graduates will explore in depth the specific aspects of this pioneering treatment, from the detailed analysis of proton beams and their clinical application, to the comprehensive assessment of the requirements necessary for the precise characterization of this advanced technique.

It will also address the fundamental differences with conventional radiotherapy, examine the interactions of ionizing radiation with tissues and delve into the key aspects of radiation protection and radiobiology associated with this technique.

This syllabus is presented as a unique and flexible space, offering a 100% online modality that adapts to the agendas of practicing professionals. In addition, the *Relearning* methodology employed will guarantee an effective assimilation of the essential concepts, ensuring that engineers acquire solid and updated skills in Protontherapy, a cutting-edge technology in Medical Engineering.

This **Postgraduate Certificate in Radiophysics in External Radiotherapy in Proton Therapy** contains the most complete and up-to-date program on the market. The most important features include:

- ♦ The development of case studies presented by experts in Radiophysics in External Radiotherapy in Proton Therapy
- ♦ The graphic, schematic and practical contents with which it is conceived provide cutting- Therapeutics and practical information on those 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



*Enter a Postgraduate Certificate designed based on the latest innovations in Medical Engineering applied to External Radiotherapy, to guarantee you a successful learning experience”*



“

*Enter today into a world-class educational experience that will elevate your professional horizons through 150 hours of the best digital teaching”*

*Specialize in Proton Therapy and become one of the most sought-after medical engineers in just 6 weeks.*

*At your own speed! The Relearning methodology used in this program will make you learn in an autonomous and progressive way.*

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

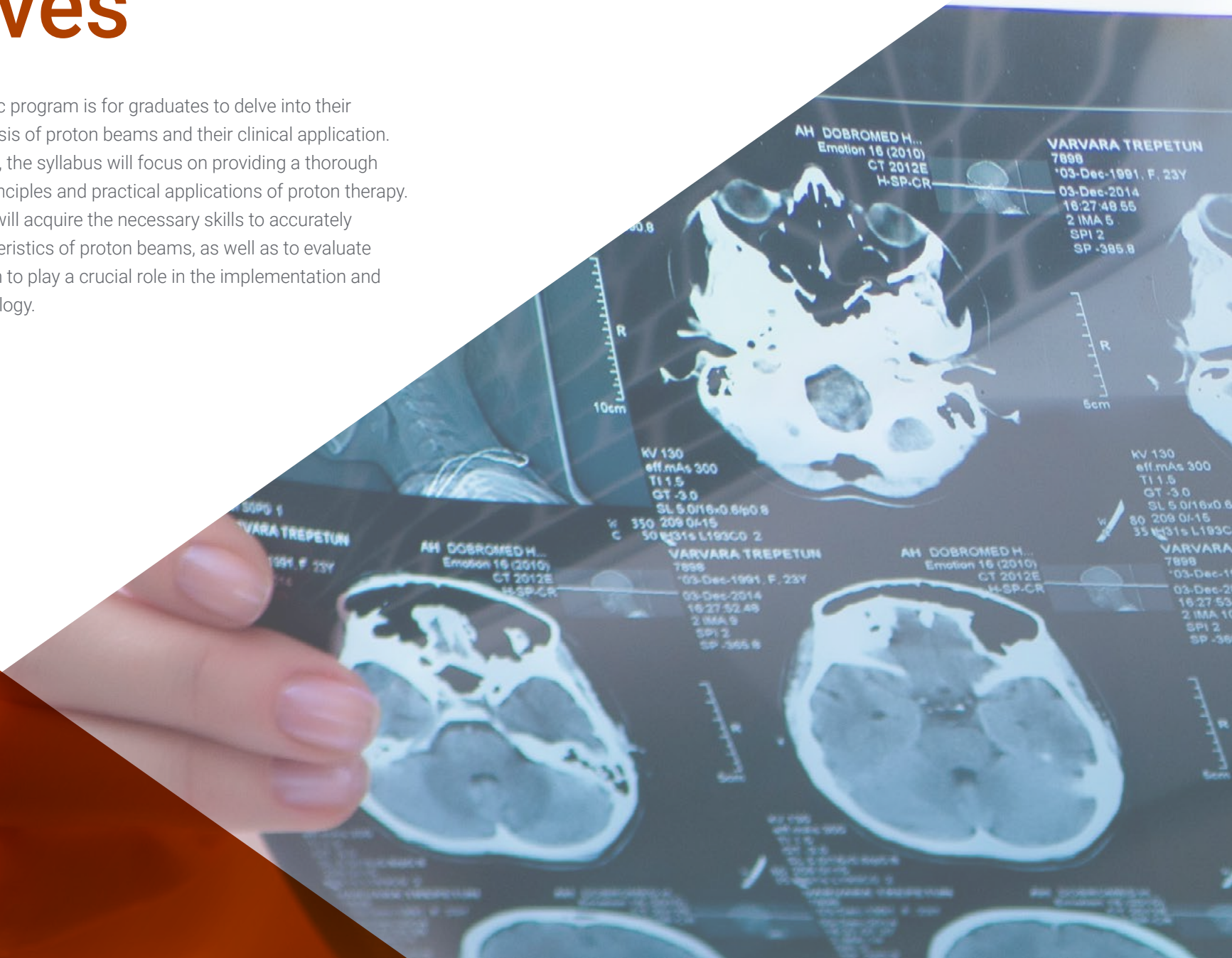
The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide immersive education programmed to learn in real situations.

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 students will be assisted by an innovative interactive video system created by renowned and experienced experts.



# 02 Objectives

The main objective of this academic program is for graduates to delve into their understanding of the detailed analysis of proton beams and their clinical application. Aimed at engineering professionals, the syllabus will focus on providing a thorough understanding of the underlying principles and practical applications of proton therapy. Throughout the syllabus, students will acquire the necessary skills to accurately analyze the generation and characteristics of proton beams, as well as to evaluate their clinical impact, preparing them to play a crucial role in the implementation and optimization of this medical technology.







“

*Through this innovative university program you will establish the differences between this modality and conventional radiotherapy. Achieve your goals with TECH!"*



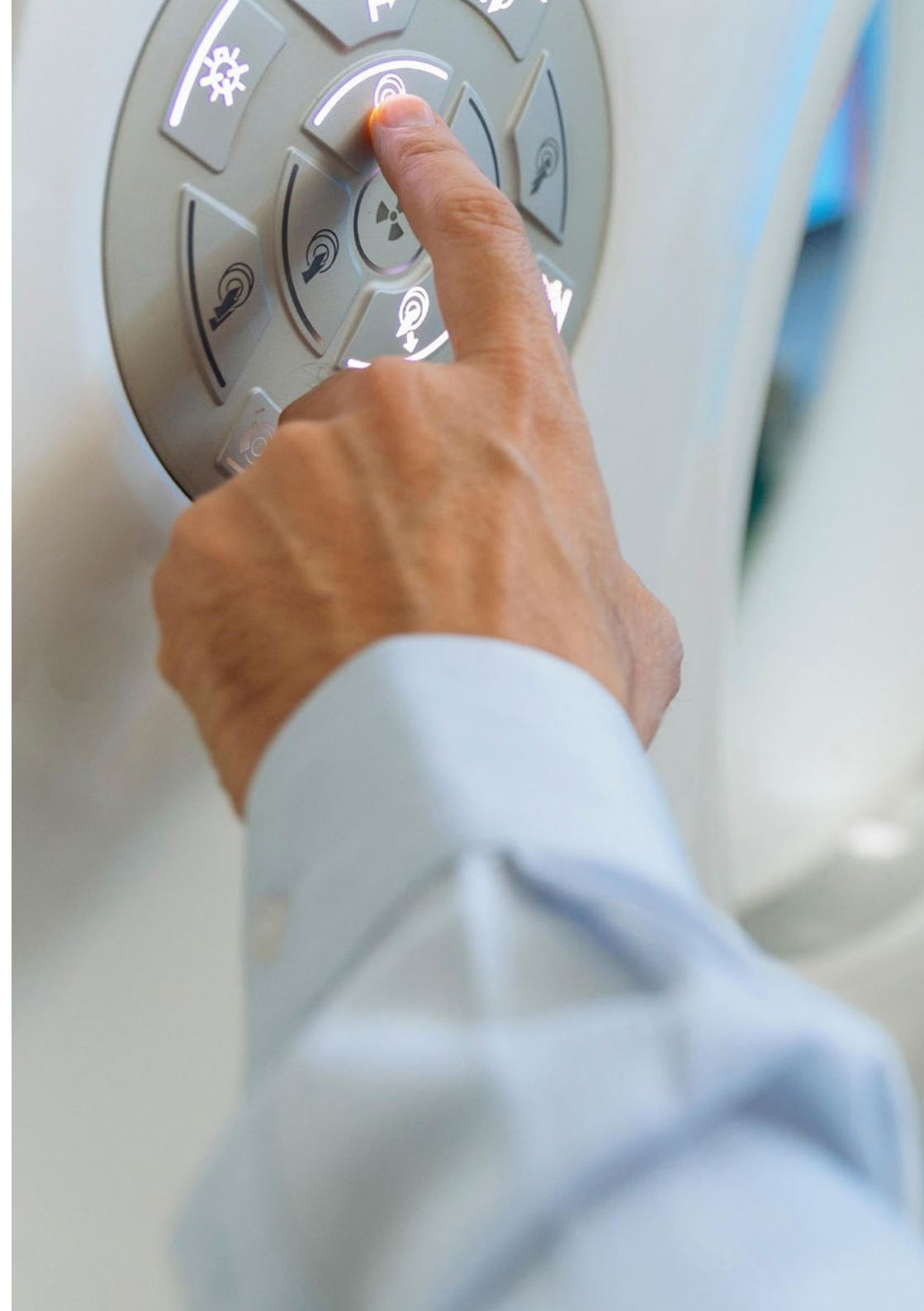
## General Objectives

---

- ♦ Analyze the interactions of protons with matter
- ♦ Examine radiation protection and radiobiology in Proton Therapy

“

*This university program  
will allow you to meet your  
professional aspirations in just 6  
weeks. Enroll now!”*





## Specific Objectives

---

- Analyze proton beams and their clinical use
- Evaluate the necessary requirements for the characterization of this radiotherapy technique
- Establish the differences between this modality and conventional radiotherapy, both technologically and clinically
- Develop specialized knowledge on radiation protection in Proton Therapy facilities



# 03

# Course Management

For the preparation of the teaching staff of the Postgraduate Certificate in Radiophysics in External Radiotherapy in Proton Therapy, TECH has made a careful selection of the best specialists in the field of Medical Engineering. The teaching staff is composed of highly qualified professionals, whose extensive and recognized professional background will ensure quality teaching. These experts will contribute their extensive practical experience and specialized knowledge, providing graduates with a comprehensive perspective of Proton Therapy.



“

*The faculty of this program has a long history of research and professional application"*



## Management



### Dr. De Luis Pérez, Francisco Javier

- Specialist in Hospital Radiophysics
- Head of the Radiophysics and Radiological Protection Service at Quirónsalud Hospitals in Alicante, Torrevieja and Murcia
- Research Group in Personalized Multidisciplinary Oncology, Catholic University San Antonio of Murcia
- PhD in Applied Physics and Renewable Energies, University of Almeria
- Degree in Physical Sciences, specializing in Theoretical Physics, University of Granada
- Member of: Spanish Society of Medical Physics (SEFM), Royal Spanish Society of Physics (RSEF), Illustrious Official College of Physicists and Consulting and Contact Committee, Proton Therapy Center (Quirónsalud)



## Professors

### Dr. Irazola Rosales, Leticia

- ◆ Specialist in Hospital Radiophysics
- ◆ Physician in Hospital Radiophysics at the Biomedical Research Center of La Rioja
- ◆ Working group on Lu-177 treatments at the Spanish Society of Medical Physics (SEFM)
- ◆ Collaborator at the University of Valencia
- ◆ Reviewer of the journal Applied Radiation and Isotopes
- ◆ International PhD in Medical Physics, University of Seville, Spain
- ◆ Professional Master's Degree in Medical Physics from the University of Rennes I
- ◆ Degree in Physics from the University of Zaragoza
- ◆ Member of: European Federation of Organizations in Medical Physics (EFOMP) and Spanish Society of Medical Physics (SEFM)

“ Take the opportunity to learn about the latest advances in this field in order to apply it to your daily practice”

# 04

## Structure and Content

This syllabus will offer professionals a unique opportunity to gain insight into the essential requirements for the characterization of this advanced radiation therapy technique. Throughout the syllabus, engineers will be immersed in an in-depth study of the fundamental principles and practical applications of Proton Therapy. From the theoretical aspects, to the practical challenges, the program will provide a comprehensive training, which will equip graduates with the necessary skills to understand and effectively apply this innovative technology in the field of Medical Engineering.



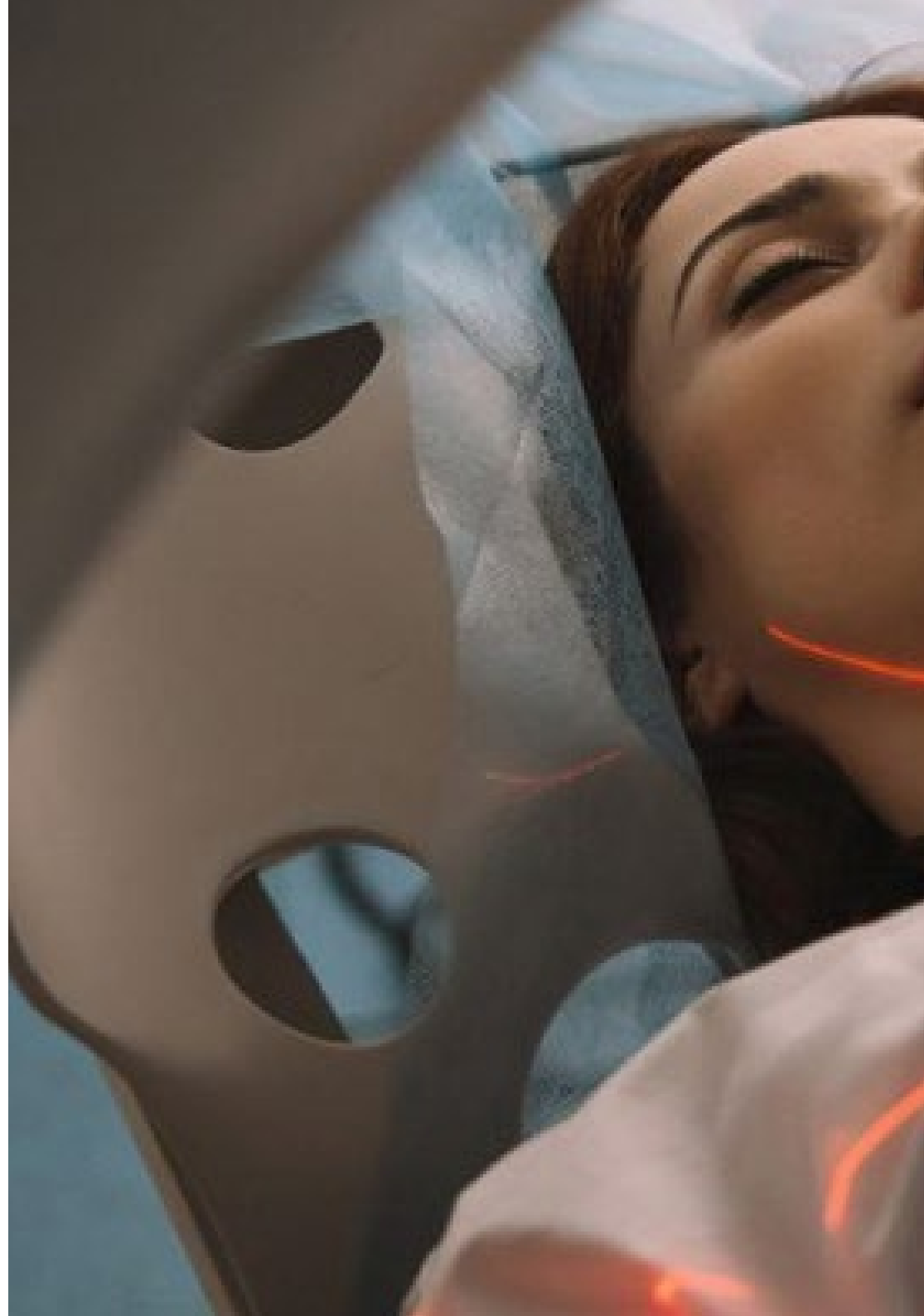


“

*Take advantage of this opportunity and take the plunge! You will get up to speed on the latest trends in radiation protection and radiobiology in Proton Therapy”*

## Module 1. Advanced Radiotherapy Method. Proton Therapy

- 1.1. Proton Therapy Proton Radiotherapy
  - 1.1.1. Interaction of Protons with Matter
  - 1.1.2. Clinical Aspects of Proton Therapy
  - 1.1.3. Physical and Radiobiological Basis of Proton Therapy
- 1.2. Equipment in Protontherapy
  - 1.2.1. Facilities
  - 1.2.2. Components of a Protontherapy System
  - 1.2.3. Physical and Radiobiological Basis of Proton Therapy
- 1.3. Proton Beam
  - 1.3.1. Parameters
  - 1.3.2. Clinical Implications
  - 1.3.3. Application in Oncological Treatments
- 1.4. Physical Dosimetry in Proton Therapy
  - 1.4.1. Absolute Dosimetry Measurements
  - 1.4.2. Beam Parameters
  - 1.4.3. Materials in Physical Dosimetry
- 1.5. Clinical Dosimetry in Proton Therapy
  - 1.5.1. Application of Clinical Dosimetry in Proton Therapy
  - 1.5.2. Planning and Calculation Algorithms
  - 1.5.3. Imaging Systems
- 1.6. Radiological Protection in Proton Therapy
  - 1.6.1. Design of an Installation
  - 1.6.2. Neutron Production and Activation
  - 1.6.3. Activation
- 1.7. Proton Therapy Treatments
  - 1.7.1. Image-Guided Treatment
  - 1.7.2. In Vivo Treatment Verification
  - 1.7.3. BOLUS Usage







- 1.8. Biological Effects of Proton Therapy
  - 1.8.1. Physical Aspects
  - 1.8.2. Radiobiology
  - 1.8.3. Dosimetric Implications
- 1.9. Measuring Equipment in Proton Therapy
  - 1.9.1. Dosimetric Equipment
  - 1.9.2. Radiation Protection Equipment
  - 1.9.3. Personal Dosimetry
- 1.10. Uncertainties in Proton Therapy
  - 1.10.1. Uncertainties Associated with Physical Concepts
  - 1.10.2. Uncertainties Associated with the Therapeutic Process
  - 1.10.3. Advances in Protontherapy

“

*Enroll in this innovative university program and you will gain access to a digital library full of multimedia resources in different audiovisual formats”*

05

# Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning**.

This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.





“

*Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"*

## 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.

“

*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.





06

# Certificate

The Postgraduate Certificate in Radiophysics in External Radiotherapy in Proton Therapy guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Technological University.







“

*Successfully complete this program  
and receive your university qualification  
without having to travel or fill out  
laborious paperwork”*

This **Postgraduate Certificate in Radiophysics in External Radiotherapy in Proton Therapy** contains the most complete and up-to-date scientific 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 Radiophysics in External Radiotherapy in Proton Therapy**

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 languages  
virtual classroom



## Postgraduate Certificate Radiophysics in External Radiotherapy in Proton Therapy

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

# Postgraduate Certificate Radiophysics in External Radiotherapy in Proton Therapy

